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Agricultural advisory services in European countries.—232 pp., Paris, Organisation for European Economic Co-operation, 1950. 2*s.* 6*d.*

This report on the present status and scope of advisory work for agricultural expansion and production in Europe contains general recommendations by a working party of experts from twelve countries and experts provided by E[uropean] C[o-operation] A[dministration] on the training of advisory personnel, the status of advisers in rural communities, co-operation with research and agricultural educational services, and various aspects of advisory methods. Part II contains reports of visits to fourteen European countries by teams of three to five members, who give a resumé of the advisory systems in the individual countries together with more specific recommendations.

PRYOR (D. E.). **Reduction of post-harvest spoilage in fresh fruits and vegetables destined for long distance shipment.**—*Food Tech.*, 4, 2, pp. 57–62, 1950.

Methods of reducing post-harvest spoilage of fresh fruits and vegetables [cf. *R.A.M.*, 28, p. 228] are reviewed, especially the use of sulphur dioxide to control decay in grapes (mostly due to *Botrytis* [*cinerea*]); carbon dioxide to prolong the storage life of apples; nitrogen trichloride for combating rots of citrus (*Diplodia natalensis*, *Penicillium digitatum*, and *P. italicum*), cantaloupes ([unspecified] common fungi), tomatoes (*Rhizopus*, *Alternaria*, etc.), [chilli] peppers [organisms unspecified], and onions (*B.* spp. and *Aspergillus niger*); and the application for this purpose of treated wraps, chemical washes, waxes, and chemically treated ice.

Many of the papers cited in the bibliography of 34 titles have been noticed in this *Review*, but the following account of work in progress at the Research Department, Wallace & Tiernan Sales Corporation, Monrovia, California, may be of interest. For many years trials have been proceeding in the development of active chlorine washes to reduce fruit and vegetable decay. This particular element was selected because once the disinfection is accomplished, only the innocuous chlorine ion remains. The activity of chlorine in relation to both pathogen and host, is strongly influenced by hydrogen-ion concentration and by combination with various amines. Molecular chlorine, for instance, while very effective against pathogenic organisms, is also quite phytoxic in solution. The problem of regulating this activity so as to destroy the pathogens without injury to the host may be solved in some cases by adjustment of the pH and in others by suppressing the activity of the chlorine through chlorination of an amine.

It is well known that the rate of bacterial kill with a given concentration of chlorine increases with a falling pH, and experiments on potatoes have shown that this is also true of the control of [unspecified] decay. However, if the pH falls very low, injury to the host is likely to result, with a consequent increase in the incidence of rotting. Above pH 7 the rate of kill decreases fairly rapidly, until at 9·5, for instance, the requisite period for destruction is about 250 times as long as at 5.

Besides reducing decay, the chlorine treatment [at the optimum level] seems to accelerate the rate of suberin formation on the peeled surfaces and to impart a brighter and more attractive appearance to the potatoes.

A new wash type process with chlorine as the active ingredient is at present under extensive commercial trial on asparagus, celery, Brussels sprouts, and spinach. It has shown promise in the control of bacterial soft rot (*Erwinia* [*carotovora*]) and pink rot (*Sclerotinia* [*sclerotiorum*]).

The waxes now on the market do not appear to reduce decay sufficiently to be of commercial value, but they help to cut down loss of weight from evaporation.

Ennis (W. B.) & James (D. T.). **A simple apparatus for producing droplets of uniform size from small volumes of liquids.**—*Science*, 112, 2911, pp. 434–436, 2 figs., 1950.

A description is given of a simple glass apparatus termed the droplet sizer, which produces individual droplets of uniform size and is adaptable for delivering very small volumes of liquids.

Tervet (I. W.) & Cherry (E.). **A simple device for collection of fungus spores.**—*Plant Dis. Reptr*, 34, 8, p. 238, 1 diag., 1950. [Multilithed.]

A brief note is given on the construction of a cyclone separator for the collection of dry spores. A centrifuge tube or test-tube is fitted with a rubber stopper through which pass two pieces of glass tubing, one straight piece projecting about 2·5 cm. centrally into the tube and a piece bent at right angles outside the tube and projecting about 1·5 cm. inside. For spore collection suction is applied by means of a vacuum pump to the central glass tube, while the orifice of the bent tube is placed over the surface on which spores are being produced and they collect at the bottom of the tube. The apparatus can also be used as a duster by reversal of air flow.

[An abstract of this paper appears in *Phytopathology*, 40, p. 874, 1950.]

Elliott (E. W.). **The effects of paradichlorobenzene on fungi.**—*Proc. Iowa Acad. Sci.*, 55, pp. 99–107, 1948. [Received December, 1950.]

In experiments carried out at the State University of Iowa, paradichlorobenzene at $\frac{1}{2}$ gm. per culture, absorbed into 1 sq. in. blotting paper, provided an effective and convenient method of controlling mites in fungus cultures [*R.A.M.*, 26, p. 310]. The mites and their eggs were killed after one day's exposure to the vapour. The insecticide was slightly toxic to all 57 fungi tested but most renewed normal growth immediately the substance was removed. *Pythium* sp., *Rhizopus nigricans* [*R. stolonifer*], *Penicillium notatum*, and *Chaetomium indicum* were the most sensitive, not resuming growth for at least 24 hours after removal, and the only myxomycete used in the tests was killed.

Brewer (J. H.). **The utility of metal Petri dish covers with absorptive disks.**—*J. Bact.*, 59, 2, pp. 237–239, 1 fig., 1950.

The author has devised a metal Petri dish cover beneath the top of which a piece of absorptive cardboard is fitted and held in place by means of indentations. An open type cover is similar except that a large circular hole is cut in it and the metal part reduced to a rim. Various indicators may be placed on the pad and hydrogen sulphide or ammonia production determined. A technique has been devised for testing aerosols and volatile antibacterial agents by applying various dilutions to the pads and seeding or streaking the agar with different organisms. By using cardboard of varying porosity in the metal rim a wide range of moisture control becomes possible.

Papazian (H. P.). **A method of isolating the four spores from a single basidium in Schizophyllum commune.**—*Bot. Gaz.*, 112, 1, pp. 139–140, 2 figs., 1950.

The following method of isolating the tetrad of spores from a basidium of *Schizophyllum* was developed in the Department of Botany, University of Chicago. The basidia are allowed to develop on 50 μ sections of hymenium resting on agar blocks on a slide in a Petri dish containing 1 or 2 ml. water. The slide and above it a cover slip rest on glass rod supports. After about 5 hrs. at room temperature when numerous basidiospores are seen laterally along the sections, a tetrad is removed with a fine glass needle mounted in a microdissector and the spores deposited at intervals along the length of another agar block. This is then transferred to a sterile van Tieghem cell and after 15 hours at room temperature the young mycelia are plainly visible under a dissecting microscope.

Moore (W. T.) & Taylor (C. B.). **An improved colony illuminator.**—*J. gen. Microbiol.*, 4, 3, pp. 448–449, 1 pl., 1 diag., 1950.

In an apparatus designed at the Butterwick Research Laboratories, Hertfordshire, for colony counts, the Petri dish is placed on a sloping box and illuminated by a surrounding ring fluorescent lamp 8 in. in diameter. Above, a detachable $\times 2$ plastic industrial inspection lens, 5 in. in diameter, is supported on three legs and can be used 6 in. from the eyes.

Reese (E. T.), Siu (R. G. H.), & Levinson (H. S.). **The biological degradation of soluble cellulose derivatives and its relationship to the mechanism of cellulose hydrolysis.**—*J. Bact.*, 59, 4, pp. 485–497, 6 graphs, 1950.

In experiments carried out at the Quartermaster General Laboratories, Pennsylvania, the growth of fungi and bacteria was very good in a mineral salts solution plus 0·01 per cent. yeast extract and containing sodium carboxymethyl cellulose (CMC) preparations of low degrees of substitution (DS), but slight when the DS was above one. When 30 organisms, including cellulolytic fungi [*R.A.M.*, 30, p. 60] and bacteria and non-cellulolytic fungi, were tested on CMC and 10 per cent. hydroxyethyl cellulose (HEC) they were all able to utilize the derivatives. The production of the enzyme (Cx) capable of hydrolysing the 1,4-β-glucosidic linkage, as found in cellulose and its derivatives and as measured by the amount of reducing sugars obtained by hydrolysis of CMC, is widespread among micro-organisms, and is produced at the same rate by non-cellulolytic and cellulolytic organisms. None of the Mucorales have so far proved cellulolytic and most of those examined were unable to hydrolyse CMC. The non-cellulolytic as well as the cellulolytic *Aspergillus* spp. are highly active on CMC and on some of the other cellulose derivatives, while the filtrates of *A. fumigatus*, *Syncephalastrum racemosum*, *Myrothecium verrucaria*, *A. flavus*, and *Actinomyces* sp. produced on CMC reducing sugars in inverse proportion to the DS, i.e., the resistance of CMC to enzymatic hydrolysis is a function of the degree of substitution [ibid., 28, p. 585]. The presence of a single substituent on every anhydroglucose unit appears to confer immunity from degradation. Below this threshold value, increasing the DS of the cellulose derivative increases its resistance. Methyl cellulose (methocel) with the high DS required for solubility is usually resistant to microbial attack. CMC and HEC, as they appear on the market, are readily hydrolysed by micro-organisms.

Marques Mesa (Alicia), Guzmán García (J.), Cravioto (R. O.), & Calvo de la Torre (J.). **Investigación de actividades antibióticas en extractos de plantas superiores.** [Investigation of the antibiotic activities in extracts of higher plants.]—*Cienc. e Invest.*, 6, 10, pp. 471–476, 1 graph, 1950.

Alcoholic, acetonic, or aqueous extracts of the following plant species exerted a measure of inhibition, which was not determined quantitatively, on the growth of

Xanthomonas phaseoli in broth cultures at the National Institute of Nutriology, Mexico City: *Crescentia* fruits, oak bark, *Caesalpinia* flowers, *Cassia* veins, *Pithecolobium* fruits, *Physalis* fruits, and *Vitex* fruits and seeds [cf. *R.A.M.*, 26, p. 350; 29, p. 271].

Jarvis (F. G.) & Johnson (M. J.). **The mineral nutrition of Penicillium chrysogenum Q176.**—*J. Bact.*, 59, 1, pp. 51–60, 7 graphs, 1950.

In quantitative studies made at the College of Agriculture, University of Wisconsin, the following elements were required for normal growth of *Penicillium chrysogenum* Q176 [*R.A.M.*, 29, p. 322] at the stated levels in μgm. per ml.: phosphorus 100, sulphur 70, potassium 40, magnesium 8, iron 0·2, and copper 0·1. The amounts of iron, phosphorus, and sulphur required for normal penicillin production were, respectively, 20, 2, and about 1·5 times those for normal growth. The fermentation time was markedly increased by potassium deficiency and decreased by iron deficiency. Seven mg. per ml. of chloride in the inoculum medium was detrimental to penicillin production in the subsequent fermentation. The culture had to be adapted to levels of copper above about 0·5 μgm. per ml.

Pichler (F.). **Untersuchungen über Magnesiumstaubschäden an Pflanzen im Laboratorium.** [Studies on magnesium dust damage to plants in the laboratory.] —*PflSch. Ber., Wien*, 4, 11–12, pp. 169–179, 5 figs., 1950. [English summary.]

In connexion with the injury to plants by magnesium dusts from magnesite works, laboratory studies, using a modification of Schmidt's 'root picture' method (*Angew. Bot.*, 16, p. 1, 1934) with rye as the test plant, showed that magnesium damage increased in the following sequence of anions: phosphate, carbonate, sulphate, chloride, bicarbonate, nitrate, oxide, and hydroxide. The deleterious action of the compounds on crops growing in loam soils may be prevented by the admixture of peat dust, while calcium salts, especially calcium sulphate, are also helpful in counteracting the injury.

Tomlinson (N.), Campbell (J. J. R.), & Trussell (P. C.). **The influence of zinc, iron, copper, and manganese on the production of citric acid by Aspergillus niger.**—*J. Bact.*, 59, 2, pp. 217–227, 1950.

When reagent grade chemicals and sucrose were used as components of the fermentation medium, zinc and iron were ascertained to be essential components for maximum citric acid production by *Aspergillus niger* strain 72–4 when grown from conidia in stationary surface culture [cf. next abstract]. Very small amounts of manganese or copper or both when added to the fermentation medium increased the yields of citric acid; excessive amounts of copper, iron, manganese, or zinc interfered with its accumulation. The amounts of iron, copper, and manganese most suitable for the production of high yields were smaller than those required for good growth of the fungus.

Foster (J. W.) & Denison (F. W.). **Role of zinc in metabolism.**—*Nature, Lond.*, 166, 4228, pp. 833–834, 1950.

In studies made in the Department of Bacteriology, University of Texas, evidence was obtained that zinc is a determinative factor in the carbohydrate metabolism of a fumaric acid-producing strain of *Rhizopus nigricans* [*R. stolonifer*] and a citric acid-producing strain of *Aspergillus niger* [cf. preceding abstract], striking differences in anaerobic respiration being obtained with and without zinc. Zinc was concluded to be essential for the synthesis of pyruvic carboxylase in *R. stolonifer*, even though at present the metal does not appear to be part of the enzyme.

Castiglione (R. di P.) & Landi (S.). **L'azione del molibdeno sui microrganismi e sulla vegetazione.** [The action of molybdenum on micro-organisms and on vegetation.]—*Ann. Fac. Agr. Pisa*, N.S., 9, pp. 313–335, 3 figs., 5 graphs, 1948. [French, English, and German summaries. Received November, 1950.]

Minute quantities of molybdenum in the form of sodium molybdate added to Czapek's medium increased the total growth of the mycelium of *Aspergillus niger* [see preceding abstracts], *A. candidus*, *Penicillium crustosum*, and *Botrytis cinerea*; it had no appreciable effect on *P. roquefortii*, *Trichothecium roseum*, and *Stachybotrys atra*, and depressed the growth of *P. notatum*, *Spicaria* sp., and *Chaetomium globosum*. Other experiments showed that it stimulated the initial stage of growth of wheat seedlings.

Citro (G.). **Qualche ricerca sull' azione biologica del rubidio.** [Some researches on the biological action of rubidium.]—*Agricoltura ital.*, 49 (N.S. 5), pp. 225–233, 2 figs., 4 graphs, 1949. [French and English summaries.]

Evidence from experiments at the University of Pisa showed that minute quantities of rubidium in the form of rubidium nitrate [*R.A.M.*, 29, p. 424] stimulated the growth of a number of fungi, including *Botrytis cinerea* and *Trichothecium roseum* [see preceding abstract].

Roberg (M.) & Kiera (G.). **Keimung verschieden alter Konidien von Aspergillus niger und Wachstum aus ihnen gezogener Mycelien.** [Germination of *Aspergillus niger* conidia of different ages and growth of mycelia derived from them.] —*Arch. Mikrobiol.*, 14, 4, pp. 705–726, 5 figs., 2 graphs, 1950.

In further studies on the viability of 12- to 13-year-old conidia of five isolates of *Aspergillus niger* [*R.A.M.*, 28, p. 27] germination at all temperatures took place after a longer period than with those of a year or four days old. Once germination was effected the conidia of all ages gave rise to uniformly vigorous mycelia, which produced normal conidia.

Villela (G. G.) & Cury (A.). **Studies on the vitamin nutrition of Allescheria boydii Shear.**—*J. Bact.*, 59, 1, pp. 1–11, 3 graphs, 1950.

In studies made at the Instituto Oswaldo Cruz, Rio de Janeiro, Brazil, optimum growth of *Allescheria boydii* [*R.A.M.*, 23, p. 341] was obtained at approximately 27° C. and pH 4 to 5, none occurring at or below pH 3. Nicotinic acid stimulated growth and pyridoxine suppressed it. The growth of the mould was found to be a function of graded amounts of biotin or of biotin analogues (desthiobiotin and O-heterobiotin).

Robbins (W. J.). **A survey of the growth requirements of some Basidiomycetes.**— *Mycologia*, 42, 4, pp. 470–476, 1 fig., 1950.

In a preliminary survey of the nutrient requirements of a group of Basidiomycetes (primarily wood destroyers) 310 isolations comprising 281 species were grown at 25° C. on a malt extract agar medium and on a basal medium [*R.A.M.*, 22, p. 219]. All grew on the malt agar, but on the basal medium 190 gave very poor growth and a substantial number developed only one-fifth to one quarter the growth they gave on the malt agar. Of 56 species of *Polyporus*, 40 responded markedly on the addition of vitamins [ibid., 28, p. 478] to the basal medium, while the growth of 13 of 17 species of *Fomes* was conspicuously improved. The superiority of the malt extract agar for these species was primarily due to the vitamin content of the malt. A few of the 20 species which grew poorly even when supplemented with vitamins grew well when casein hydrolysate was added to the basal

medium while some needed ammonium nitrate. Some grew poorly on all media except the malt extract.

Bose (S. R.). **On plant vacuoles functioning as storehouse of various enzymes.**—*La Cellule*, 53, 2, pp. 153–159, 1 pl., 1950.

In *inter-vitam* and *post-vitam* studies at the Carmichael Medical College, Calcutta, of the pinkish vacuoles in the hyphae of *Polyporus durus*, *Polystictus sanguineus*, and *Phoma casuarinae*, it was found that oil droplets, glycogen, and protein granules were formed first in the region of the protoplasm immediately adjacent to the vacuoles when the fungi were grown in liquid media containing, respectively, fatty acids, glucose or sucrose (4 per cent.), and peptone (2 per cent.). Hydrolysis of these substances took place at the vacuolar membrane when the fungi were plasmolysed in solutions of sodium chloride (5 to 10 per cent.) or glucose and sucrose (12 to 16 per cent.). It is concluded that plant vacuoles (especially in fungi) most probably function as storehouses of enzymes.

Edwards (G. R.). **New Potato varieties.**—*J. Dep. Agric. S. Aust.*, 54, 2, pp. 74–75, 1 fig., 1950.

The information in this article on the disease resistance of the recent potato introductions Monak and Moona [*R.A.M.*, 29, p. 49] and Kennebec [ibid., 28, p. 139], now being tried in Queensland, has already been noticed from other sources.

Hutton (E. M.). **The relationship between colour and necrosis to Potato virus X in Amaranthus gangeticus L.**—*J. Aust. Inst. agric. Sci.*, 15, 3–4, pp. 131–134, 4 figs., 1949. [Received June, 1950.]

Leaves of *Amaranthus gangeticus* covering a complete colour range were inoculated in the greenhouse with a necrotic strain of potato virus X [*R.A.M.*, 29, p. 114]. After 20 days well-developed, necrotic ring spots developed, particularly in the green areas of the leaves. The yellow areas had a few spots while in green parts tinged with red the spots were reddish and non-necrotic. *Datura stramonium* plants developed severe X symptoms when inoculated from all these parts. It was shown that the necrotic reaction is favoured by a high proportion of chlorophyll (associated with a high level of photosynthesis) and suppressed by a preponderance of the carotinoids, particularly carotin.

Davidson (T. R.). **Phloem necrosis of Potato tubers in relation to leaf-roll-free Myzus persicae Sulc.**—*Canad. J. Res.*, Sect. C, 28, 3, pp. 283–287, 1950.

Because some insects feeding on potato plants may cause a phloem necrosis [*R.A.M.*, 24, p. 70] not associated with potato leaf roll virus [ibid., 30, p. 66], experiments were carried out in 1947 and 1948 at the University of Alberta to ascertain whether populations of non-viruliferous *Myzus persicae* feeding on potato plants would cause the disorder. Feeding 25 to 50 individuals per plant in the field for 7 and 10 days failed to induce subsequent phloem necrosis in the tubers as determined by eye inspection.

Heinze (K.). **Die Unterscheidungsmerkmale der Kartoffelblattläuse und die Bedeutung der einzelnen Arten als Virusüberträger.** [The distinguishing features of Potato aphids and the importance of the various species as virus vectors.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F., 2, 12, pp. 205–211, 12 figs., 1948. [Received June, 1950.]

In years with high aphid populations late virus infections of seed potato plants can be considerably reduced by insecticide sprays [*R.A.M.*, 29, p. 274]. Counts should be made per 100 leaves early in June and if the numbers of *Myzodes* (*Myzus*)

persicae exceed 50, spraying is advisable. To enable growers to distinguish *M. persicae* from less dangerous potato aphids, tables are presented with the important characteristics of the various species attacking potato.

Emilsson (B.) & Gustafsson (N.). **Undersökningar beträffande bekämpning av bladmögel och brunröta hos Potatis. V. Försök med blastdödande medel under år 1949.** [Studies relating to the control of Potato blight. V. Further experiments with haulm-killing preparations during the year 1949.]—*K. Landtbr-Akad. Tidskr., Stockh.*, 89, 2, pp. 130–152, 2 figs., 1950. [English summary.]

Continuing their experiments on the control of potato blight [*Phytophthora infestans*] by means of haulm-killing chemicals [*R.A.M.*, 29, p. 169], the authors carried out large-scale tests with the chemical Ewos 936 (2 per cent. plus the same amount of aluminium sulphate) on 13 Swedish farms. In seven cases the results were adjudged to be satisfactory and in three moderately so. The best results were obtained on fairly well-developed or ripening haulm. In the three unsatisfactory cases high-pressure spraying machines delivering only 500 to 800 l. fluid per ha. were used in place of the low-pressure Favorit, giving 1,000 to 1,050 l. About half the attempts to improve the performance of the sprayers by trailing a heavy plank in front of the nozzles were successful. In similar trials at the Plant Research and Cold Storage Institute, Nynäshamn, sulphuric acid (10 per cent. by volume) exerted a considerably more rapid and completely destructive action on the haulm than Ewos 936. The spraying machine used was the S.A.I. Compressor Type, which is specially constructed for the application of sulphuric acid. Where facilities exist for the provision of the right type of machinery for using sulphuric acid and the workers are properly trained, the procedure should be reasonably safe.

Tuber infection was also effectively combated by haulm-killing with 10 per cent. TAC 46 [loc. cit.] and 2 per cent. Ewos 936, both with the same quantity of aluminium sulphate. The practical value of the treatment for this phase of the disease is considered to be firmly established.

The effect of haulm-killing on production was investigated in a series of tests on the Arran Consul, Bintje, Early Puritan, President, and Up-to-Date varieties in which the haulm was killed on four different dates (32, 24, 16, and 8 days) before harvest. The total yield was reduced after the destruction of the haulm, but in most cases the number of healthy tubers of seed size (28 to 55 mm.) was increased. The treatment was rated as profitable for all the varieties except Arran Consul. The later the haulm was killed, the higher were the starch and dry matter contents of the tubers. The resistance of the skin to mechanical damage was appreciably enhanced by haulm-killing, especially at an early date.

Zakopal (J.). **Příspěvek k methodice zkoušení nových kříženců Bramborových na vzdornost k rakovině.** [Contribution to the methodology for testing new Potato hybrids for resistance to wart disease.]—*Ochr. Rost.*, 23, 2, pp. 106–115, 7 figs., 1950. [Russian and English summaries.]

The Institute for Plant Protection, Brno, Czechoslovakia, uses the following method of testing new potato hybrids for resistance to wart disease (*Synchytrium endobioticum*) [*R.A.M.*, 30, p. 70] at its experimental plot at Velké Karlovice. The plot with clay-sandy soil (pH 6·85) and yearly precipitation of about 700 mm. is divided into two parts, on which the hybrids to be tested and cereal crops are grown in rotation. The potato tubers are planted in a row, and after every fifth one follows a tuber of a susceptible variety, such as Wohltmann, Industry, or Hassia, the first-named giving the best results. After the harvest the wart tumours are crushed and spread evenly on the part of the field to be planted with potatoes. Since the author started the testing in 1940 the susceptible varieties have always shown 100 per cent. infection.

Sethofer (V.) & Jermoljev (E.). **K otázce vzdornosti Bramborových odrůd proti Rhizoctonii (Rh. solani).** [On the resistance of Potato varieties to *Rhizoctonia* (*R. solani*).]—*Ochr. Rost.*, 23, 2, pp. 89–106, 7 figs., 1950. [Russian summary.]

Isolations from potato tubers affected by *Rhizoctonia* [*Corticium*] *solani* [*R.A.M.*, 26, p. 508], originating from various localities in Moravia and Slovakia, Czechoslovakia, yielded eight biological forms of the pathogen which differed morphologically in culture. In resistance tests healthy tubers in pots of inoculated soil were placed in a greenhouse at 10° C. Of 16 local varieties (selections of Keřkov) tested none proved resistant, but those which sprouted quickly had mostly a lower infection coefficient. The results showed that the different forms of *C. solani* attack different varieties with varying intensity and vary in their virulence. Simultaneously 80 varieties from world selections were tested for resistance, and although none was resistant those with low infection rates will be investigated further.

Gigante (R.). **Il marciume secco da Sclerotium dei tuberi di Patate.** [Dry rot of Potato tubers caused by *Sclerotium*.]—*Ital. agric.*, 83, pp. 263–265, 1946. [Abs. in *Boll. Staz. Pat. veg. Roma*, Ser. 3, 1–4, pp. 14–15, 1943–1946 (published 1950).]

Potatoes growing in northern and central Italy are occasionally attacked by *Sclerotium rolfsii* [*R.A.M.*, 11, pp. 406, 748; 25, p. 415], severe losses being caused in some years. The fungus affects the collar region, where it produces a form of foot rot, the plant turning yellow and rapidly wilting. Greyish-brown, slightly sunken spots 20 to 30 mm. in diameter appear on the tubers and may spread until they cover a large part of the surface. The pulp in the affected part later becomes yellowish or brown. Infection spreads inwards and in advanced stages the diseased part is dark brown and composed of numerous semi-circular, concentric, spongy layers. In many instances a large cavity forms and becomes filled with spherical, elliptical, or irregular sclerotia mostly 1 to 3 mm. in diameter. The disease occurs mostly in sandy or compact clay soils, and is favoured by hot, moist weather.

Control consists in improved soil aeration, the use of healthy tubers, the prompt destruction of infected plants, and the disinfection of the holes with 5 per cent. formalin or a mixture of copper sulphate (½ kg.) and ammonia (½ l.) in 100 l. water. When the attack is very severe potatoes and other susceptible hosts should not be grown for at least two years.

Wade (G. C.). **Potato fire blight.**—*Tasm. J. Agric.*, 21, 3, pp. 211–215, 2 figs., 1950.

For many years potato growers in north-west Tasmania and in the Scottsdale and Bagdad districts have experienced losses from a condition termed 'fire blight', characterized by bronzing of the older leaves and the development of small necrotic spots between the veins, which enlarge rapidly and coalesce, frequently causing the death of the entire plant. Full tuber development is prevented and the yield considerably reduced. The condition, most common on the variety Brownell, was found to be due to potassium deficiency [cf. *R.A.M.*, 28, pp. 158, 479] and was corrected by dressings of 1 cwt. potassium sulphate per acre.

Lansade (M.). **Recherches sur le flétrissement bactérien de la Pomme de terre, Corynebacterium sepedonicum (Spieck. et Kott.) Skaptason et Burkholder.** [Researches on the bacterial wilt of the Potato, *Corynebacterium sepedonicum* (Spieck. & Kott.) Skapt. & Burkh.]—*C. R. Acad. Agric. Fr.*, 36, 11, pp. 403–406, 1950.

A brief account, based on studies carried out at the Central Station of Plant Pathology, Versailles, is given of the symptoms, cause, and control of bacterial

ring rot of potatoes (*Corynebacterium sepedonicum*) [*R.A.M.*, 27, p. 537; 29, p. 530], investigations into which were begun in 1934 by Duboys and Foëx. Control is recommended by the planting of whole tubers or the disinfection of the cutting-knife [ibid., 29, pp. 52, 117], and roguing. Careful roguing is the most useful and most acceptable method. All dwarfed plants and later all those which wilt are removed at the end of the growing period. The adoption of this method has become unavoidable, owing to the severe standards set by the Official Commission for the Control of Production of Selected Plants, and its application, as carried out by the Technical Services of the National Federation of Potato Producers, has proved highly effective.

AIYAR (S. P.). **Straw manuring in relation to amyitpo disease of Rice.**—*Proc. Indian Acad. Sci.*, Sect. B, 31, 3, pp. 181–192, 3 pl., 1950.

A nutritional disease of rice, known locally as 'amyitpo' (root rot) disease, occurring near Mandalay, Burma, has been shown by the author [*R.A.M.*, 28, p. 239] to be identical in symptoms with those of potash deficiency, though a fair response was given in pot tests to applications of ammonium sulphate also. Experiments showed that rice straw manuring depressed the growth of rice in proportion to the rate of application, inducing the amyitpo symptoms. The largest application resulted in complete rotting of the crop. With the addition of acriflavine solution, however, straw proved to be highly beneficial. Partial sterilization of Patheingyi soil led to a crop of normal appearance but only of moderate yield. Field applications of potassium sulphate were very effective and the plants became normal in every instance. Burning of the stubble after harvest is also recommended.

WILHELM (S.). **Verticillium wilt in acid soils.**—*Phytopathology*, 40, 8, pp. 776–777, 1950.

The correctness of Chester's statement [*R.A.M.*, 22, p. 321] that *Verticillium* wilt does not occur on acid soils is questioned. In California, for instance, severe outbreaks of the disease have been repeatedly observed on soils well within the acid range, and in each case the field identification was confirmed by the isolation of *V. albo-atrum* from the vascular tissues of the hosts, comprising tomato [ibid., 29, p. 540] (pH 4·6, 4·8, 4·9, and 6·4), strawberry [ibid., 28, p. 342] (pH 6, 6·1, and 6·5 to 6·7), and cabbage [ibid., 29, p. 448]. Greenhouse tomatoes in a soil of pH 4·9 were also attacked. In the peat soils of San Joaquin County, where reactions as low as pH 4·5 are common, some tomato fields show 80 to 90 per cent. infection. In Santa Cruz County, too, where the soils generally range from pH 5·5 to 6·5, the wilt is a limiting factor in the cultivation of strawberry, boysenberry, youngberry, and tomato. It is concluded from these data that the development and severity of *Verticillium* wilt are not appreciably modified by soil reaction within the range commonly used for the cultivation of susceptible crops.

TIMONIN (M. I.). **Soil microflora in relation to manganese deficiency.**—*Sci. Agric.*, 30, 7, pp. 324–325, 1 pl., 1950.

Continuing an investigation in Ottawa, Canada, on the relationship of the soil microflora to manganese deficiency in soil [*R.A.M.*, 19, p. 430; 27, p. 359], the author isolated on calcium citrate+manganous sulphate agar *Helminthosporium victoriae*, *Curvularia lunata*, *C. brachyspora*, *C. inaequalis*, *Periconia circinata*, and *Cephalosporium* sp., several unidentified fungi, bacteria, and actinomycetes all of which are capable of oxidizing manganous salts on artificial media as well as in sterilized and unsterilized soil agar plaques. The addition of asparagine stimulated oxidation, whereas calcium nitrate retarded it.

Sheffield (Frances M. L.). **The Clove trees of the Seychelles.**—*E. Afr. agric. J.*, 16, 1, pp. 3–8, 1950.

A visit was paid to the Seychelles from 25th March to 14th April, 1950, mainly to ascertain whether certain characters of the clove plant found in trees suspected of sudden death [*R.A.M.*, 29, p. 382] and others diagnosed as healthy in Zanzibar [ibid., 30, p. 75] are peculiarities of the clove or are due to incipient infection by the disease. There is no sudden death disease present in the Seychelles and the trees, except those continually lopped for their leaves, are well-grown and healthy. The only visible symptom similar to those present in Zanzibar is a mottle which appears at one stage in the development of the leaves; it is invariably present in the Seychelles cloves. All the anatomical pecularities [loc. cit.] were found. A discoloration of the root phloem considered to be diagnostic of sudden death in certain sandy parts of Zanzibar and present everywhere on red clay was invariably present in the Seychelles, as were bodies in the leaves. It is concluded that none of the characters as yet observed in the clove can be considered as diagnostic of sudden death.

Nattrass (R. M.). **Pyrethrum wilt in Kenya caused by Sclerotinia minor.**—*E. Afr. agric. J.*, 16, 1, p. 53, 1950.

Wilt of pyrethrum [*Chrysanthemum cinerariaefolium*] caused in Kenya by *Sclerotinia minor* [*R.A.M.*, 26, pp. 233, 548] first shows as a sudden wilting and drying-up of the leaves. In later stages this form of wilt can be distinguished from that due to *Fusarium graminearum* [*Gibberella zeae*] and *F.* sp. [cf. ibid., 28, p. 642] by the bleached appearance of the dead parts of the plant. Three-month-old pyrethrum seedlings in a glasshouse were infected and killed following soil inoculation with agar cultures. The sporadic occurrence of the disease in nature suggests some contributory factor, the nature of which has not yet been determined.

Brown (J. G.) & Boyle (Alice M.). **Canaigre leaf spot.**—*Plant Dis. Reptr*, 34, 6, p. 178, 1 fig., 1950. [Multilithed.]

Canaigre (*Rumex hymenosepalus*), being grown in an experimental plot in Arizona in connexion with tannin production, was affected by pale yellow to pale brown, translucent leaf spots up to 2 cm. in diameter due to *Ovularia canaegricola* [cf. *R.A.M.*, 1, p. 453]. The conidiophores were up to 80 μ long and the conidia 15 to 24 by 8 to 11 μ.

McKinney (H. H.). **Studies on the virus of Nothoscordum mosaic.**—*Phytopathology*, 40, 8, pp. 703–706, 1950.

Mosaic of false garlic (*Nothoscordum fragrans*), reported by the writer from the Canary Islands in 1929 [*R.A.M.*, 9, p. 260], was observed in 1945 in Louisiana, where apparently identical material was collected by D. C. Bain. The virus, which causes a pale green foliar mottling, is readily transmissible by wiping the leaves of healthy seedlings with juice from diseased plants, using carborundum as an abrasive. The optimum temperature for infection is from 16° to 20° C., and the incubation period ranges from 11 to 24 days. None of the other 15 species of plants used in inoculation tests proved susceptible to the false garlic virus, which appears to be distinct from any of those hitherto described on members of the Gramineae or Liliaceae and is accordingly designated *Marmor angustum* n.sp. or *Nothoscordum* mosaic virus.

The dilution end point of the virus in water was found to lie between 10^{-4} and 10^{-5}. It was inactivated by ten minutes' exposure to a temperature of 58° to 60°. Infectivity was lost when juice from diseased foliage was stored at room temperature for 20 days, and diminished by 52 days' maintenance at 4° to 5°. The activity

of the virus was reduced to nil in leaves kept air-dry in the laboratory for 43 days; 40 per cent. of the test plants were infected from material stored 40 days. The virus from *N. fragrans* passed the Berkefeld 'N' filter, but not the 'W' or finer makes (average pore size 0·78 μ).

HIRSCHHORN (ELISA). **Un nuevo método de infección artificial con el carbón de la Caña de Azúcar.** [A new method of artificial infection with Sugar-Cane smut.]—*Rev. Invest. agríc., B. Aires*, 3, 4, pp. 335–344, 1949.

The development of sugar-cane varieties resistant to smut (*Ustilago scitaminea*) in Argentina [*R.A.M.*, 29, p. 354] has been delayed by the lack of a dependable method of inoculation. Of the various procedures tested, the most convenient and effective, resulting in up to 100 per cent. infection, consisted in the immersion of sterilized, intact or wounded dormant buds in a dense aqueous suspension of chlamydospores or sporidia, and maintaining a partial vacuum for 15 to 20 minutes. Other methods producing differing degrees of infection involved painting the buds with chlamydospores, as practised in India [ibid., 20, p. 135], spraying them with a dense suspension of chlamydospores or culture material, and the injection of the same kind of inoculum with a hypodermic syringe into seedlings 1 to 60 cm. in height. Attention is drawn to the great susceptibility to *U. scitaminea* of the C.P. 807 and C.P. 2817 varieties from the United States, where the fungus is not known to occur.

STEVENSON (G. C.). **Report on the Sugar Cane variety situation in Trinidad.**—*Bull. Brit. W. Ind. centr. Sug. Cane Breed. Sta.* 31, 10 pp., 1950.

On p. 5 of this report it is stated that in Trinidad no major disease problem exists in sugar-cane. Mosaic disease [sugar-cane mosaic virus] occurs occasionally [*R.A.M.*, 28, p. 162], mainly in the southern areas. Officers of the Department of Agriculture inspect all plots and destroy all infected stools. It appears that the strain of mosaic present is similar to that occurring in Barbados, as in neither country does it cause epidemics in B. 34104 and B. 37161 [ibid., 29, pp. 121, 383], while both varieties are heavily attacked in Jamaica, the Dominican Republic, and Puerto Rico, where probably another strain is active.

MULLER (A. S.). **A preliminary survey of plant diseases in Guatemala.**—*Plant Dis. Reptr*, 34, 6, pp. 161–164, 1950. [Multilithed.]

This preliminary survey of plant diseases in Guatemala [*R.A.M.*, 11, p. 430], based on collections made by the author and maintained at the National School of Agriculture, covers 60 hosts. Most of the diseases were the object of observation during the period 1941 to 1950. The annotated list is arranged under the Latin names of the hosts, grouped into garden crops, field crops, fruit, and flowers. Mention may be made of *Cercospora beticola* on beet, mangolds, and Swiss chard, *Bremia lactucae* on lettuce, *Alternaria solani* and *Cladosporium fulvum* on tomato, *Puccinia arachidis* on groundnut, *Puccinia glumarum* on wheat, *Pseudopeziza medicaginis* on lucerne, *Cercospora oryzae* and *Piricularia oryzae* on rice, *Sorosporium reilianum* on maize, *Elsinoe fawcetti* on sour orange and lemon, *Cordana* [*Scolecotrichum*] *musae* on banana, and *Venturia inaequalis* on apple.

CUNNINGHAM (G. H.). **Australian Polyporaceae in herbaria of Royal Botanic Gardens, Kew, and British Museum of Natural History.**—*Proc. Linn. Soc. N.S.W.*, 75, 3–4, 349–350, pp. 214–249, 1950.

As a result of studying collections of Polyporaceae from Australia, Tasmania, and New Guinea in the herbaria of the Royal Botanic Gardens, Kew, and the British Museum of Natural History in 1948, the author gives a complete list of

species and their synonyms, together with the collections from this region available for study in these herbaria. One new name and a number of new combinations are made in the light of recent revisions of the genera [*R.A.M.*, 29, p. 584].

Savile (D. B. O.). **North American species of Chrysomyxa.**—*Canad. J. Res.*, Sect. C, 28, 3, pp. 318–330, 1950.

After mentioning the adaptation of the genus *Chrysomyxa* to the short growing season of the subarctic, the author discusses the taxonomy of the North American species and their distribution in northern Canada. A key to the aecidial stages is presented for the first time and new keys to the uredo- and teleutospore stages given. *C. ledicola* [*R.A.M.*, 29, p. 81] and *C. empetri* [ibid., 16, p. 647] are reported as extending on the teleutospore host (*Ledum* spp.) far beyond the limit of the aecidial host, spruce (*Picea* spp.). *C. roanensis* is known only from Tennessee on *Rhododendron* spp., although aecidia on *P. rubens* are considered to be almost certainly of the same species. *C. piperiana* [ibid., 15, p. 760] occurs on *R. californicum* and *P. sitchensis* in California, Oregon, and Washington. *C. rhododendri* [ibid., 22, p. 231], newly reported from North America, appears as *C. ledi* var. *rhododendri* n. comb. and *C. cassandrae* [ibid., 18, p. 643] as *C. ledi* var. *cassandrae* n. comb., while a new variety *C. ledi* var. *ledi* is made to accommodate specimens collected by W. P. Fraser in 1910 and 1911 on *P. mariana*. The distinctions between the three varieties lie in the uredospore warts. *C. ilicina* on *Ilex opaca* is now known from Tennessee as well as West Virginia in its uredospore state. *C. pyrolae* [ibid., 20, p. 1] on *Pyrola* spp. and *Picea* spp. cones is circumboreal and one of the more abundant species; *C. weirii* [ibid., 18, p. 725] is of limited distribution, and the teleutosori are scattered on the spruce needles. *C. woronini* [ibid., 20, p. 1] is reported in North America (Quebec and Yukon) for the first time on *Picea glauca* and *Ledum palustre* var. *decumbens*.

Corner (E. J. H.). **A monograph of Clavaria and allied genera.**—xv+740 pp., 16 col. pl., 298 figs., London, Geoffrey Cumberlege, Oxford University Press, 1950. £5. 5*s*. 0*d*.

This monograph, illustrated by excellent plates and figures, is a monumental work of highest importance in the systematics of the Basidiomycetes, being the first investigation on a world-wide basis of the developmental morphology of a single group. The general part of the work contains a description of the clavarioid fruit body, the affinity of the 27 genera described, their geographical distribution, and methods of collection, study, and identification. Taxonomic and morphological notes on the genera, which include nine new ones, are followed by a classification. Both a natural and an artificial key to the genera and species keys are given. In the genus *Typhula*, *T. borealis* [*R.A.M.*, 28, p. 279] is put under *T. idahoensis* [ibid., 19, p. 351; 29, p. 255] (on leaves and stems of wheat and *Agropyron cristatum*), with which it is stated to be very similar if not identical. *T. incarnata* (syn. *T. itoana* [ibid., 15, p. 348; 29, p. 255] and *T. graminum* [ibid., 25, p. 217]) is often parasitic on cereals. The author has found no difference in the published descriptions of *T. incarnata* (as revised by Donk) based on European material and *T. itoana* on Japanese material.

There is a general bibliography, an index to genera, species, and synonyms, and 12 pages of novitates.

Pridham (T. G.) & Raper (K. B.). **Ashbya gossypii—its significance in nature and in the laboratory.**—*Mycologia*, 42, 5, pp. 603–623, 3 figs., 1 diag., 1950.

The available information regarding *Ashbya* (*Nematospora*) *gossypii* [*R.A.M.*, 10, p. 692; 18, p. 309], assembled at the Northern Regional Research Laboratory,

Peoria, Illinois, is reported in this paper. The occurrence, host range, and pathogenicity are described and the taxonomy and relationships discussed. The cultural, morphological, and physiological characteristics are described with reference to the literature (81 titles) and the authors' own studies. Swollen hyphal elements termed 'bulb-forms' are typical of flavinogenic strains of the fungus and occur in cultures where riboflavin [cf. ibid., 25, p. 354] has been synthesized. The cells vary in size and appearance and are either terminal or intercalary, sometimes resembling chains of yeast-like cells.

KARLING (J. S.). **The genus Physoderma (Chytridiales).**—*Lloydia*, 13, 1, pp. 29–71, 1950.

After briefly reviewing the history of *Physoderma* and *Urophlyctis* [cf. *R.A.M.*, 11, p. 403] the author expresses the view that Schroeter's original distinctions between them are no longer valid and the concepts of Magnus are of doubtful diagnostic value, and, therefore, the two should be merged under the older generic name *Physoderma*. The possibility that other, more valid distinctions may be found when all the species are fully known must, however, be kept in mind. So far ephemeral zoosporangia have been observed in only six species and germination of resting sporangia in only seven, being described with certainty in only three of the so-called *Urophlyctis* species, *U. rubsaameni*, *U. alfalfae*, and *U.* sp. [ibid., 25, p. 67]. In these species there is no lid, but the sporangium wall cracks irregularly. If this proves to be the characteristic, normal type of germination for all gall-forming or *Urophlyctis* species and if the lid in *Physoderma* is regarded as an operculum and it is ascertained to be lacking in *Urophlyctis*, the two genera might be distinguished as operculate and inoperculate. In *P. menyanthis* [ibid., 26, p. 357], however, the lid may be present or absent. The summer zoosporangia are usually epibiotic, but it appears that they may occasionally develop endobiotically on the rhizomycelium (Gopalkrishnan, K. S. A preliminary report on the pathology of *Physoderma graminis* (Büsgen) Minden. 65th Annual Meeting Indiana Academy of Science, 1949). Should such zoosporangia be found to occur in most or all species, it would show that *Physoderma* and *Cladochytrium* are closely related and there would be no strong reason for maintaining *Physoderma* in a separate family. The fundamental structure and development of the rhizomycelium are similar to those of *Cladochytrium*, as far as is known.

The filamentous, endobiotic rhizomycelium bears intercalary, usually septate enlargements. The usually filamentous rhizoids may sometimes be digitate or haustorium-like. The gregarious, ephemeral sporangia, developing on monocentric, eucarpic thalli, dehisce by an apical papilla and proliferate once to several times. They are subtended by a small endobiotic apophysis and rhizoids. The zoospores are usually smaller than those from the resting sporangium and vary in shape, usually tapering at the posterior end, with a conspicuous, eccentric, refractive globule. The terminal or intercalary resting sporangia are formed on the endobiotic rhizomycelium from one of the cells of the enlargements or from a short outgrowth. They are smooth or grooved, amber or light to dark brown, and usually have a thick epispore and a thin endospore. They germinate by forming an endosporangium, which pushes up a lid or cracks the epispore irregularly and emits zoospores by deliquescence of an apical papilla.

As presented in this paper *Physoderma* includes some 50 species [which are described] parasitic on higher plants, many so slightly known that their validity is questionable. Among the new combinations made are *P.* (*U.*) *leproides* [ibid., 14, pp. 429, 548], *P.* (*U.*) *alfalfae* [ibid., 28, p. 577], *P.* (*U.*) *trifolii* (*U. bohemica*) [ibid., 11, p. 721], *P.* (*U.*) *vagabunda* [ibid., 5, p. 127], *P. hemisphaericum* (syn. *U. hemispherica* and *U. kriegeriana*), and ten others. Included also are *P. maydis* [ibid., 25, p. 154; 26, p. 357; 28, p. 284] and *P. graminis* [ibid., 13, p. 520].

Gadd (C. H.). **The commoner diseases of Tea.**—Monographs on Tea Production in Ceylon, No. 2, Tea Research Institute of Ceylon, 94 pp., 15 pl., 1949.

In this work, intended primarily to assist young growers in Ceylon, the author, avoiding technicalities as far as possible, describes the principal diseases of tea and their control.

Hainsworth (E.). **Plant pathological branch.**—*Rep. Tocklai Exp. Sta. Indian Tea Ass., 1948*, pp. 26–31, [? 1949].

In this report [cf. *R.A.M.*, 28, p. 249] it is stated that in March, 1948, a new and important disease of tea was observed in the Badulipar Company's seed bari in the Golaghat district on young dead fruits. It was subsequently found on young fruits and flowers in seed baries at Tocklai and Cinnamara (Sibsagar district), Tippuk and Gaipani (Doom Dooma district), and Doomur Dullong, Sepon, Dekhari, and Thowra (Moran district). In no instance was material from any seed bari unaffected. From October to December (i.e., during flowering) the petals of affected flowers develop a mould and turn brown. They wither on the stalk and remain attached to the plant for some time; unaffected petals drop off while apparently still fresh. In the calyx a flat, black sclerotium develops, about $\frac{1}{10}$ in. long. Most of the affected flowers remain sterile, and the calyx turns brown and falls off. If the affected flowers have set seed the developing fruit turns black and drops when about the size of a pea. The sclerotium rests until the next flowering, when it develops an apothecium and produces ascospores, which are discharged on the petals and produce fresh infection. The disease appears to be caused by a new species of *Botryotinia*. Experiments on control are in progress.

In spraying experiments against blister blight [*Exobasidium vexans*: ibid., 29, p. 538] perenox and copper sandoz gave the best results. Treatments were not effective unless repeated at intervals of seven to ten days during the epidemic period. Further work is in progress.

Bawden (F. C.) & Pirie (N. W.). **Some factors affecting the activation of virus preparation made from Tobacco leaves infected with a Tobacco necrosis virus.**—*J. gen. Microbiol.*, 4, 3, pp. 464–481, 1950.

Preparations of tobacco necrosis virus [*R.A.M.*, 29, p. 279] were made at Rothamsted Experimental Station by the ultracentrifugation of sap from infected White Burley tobacco leaves after a preliminary concentration by freezing. Not all the anomalous nucleoprotein in these preparations was infective, and the products were fractionated by differential ultracentrifugation at lower speeds and by precipitation at pH 4 in the presence of sedimentable protein from uninfected leaves. The more readily sedimentable and precipitable material was the most infective and the other had greater serological activity.

As much virus could be extracted from leaf residues as occurred in the sap, its infectivity depending on the medium used for extraction. The authors suggest that much of the infectivity of this virus in sap is acquired during or after extraction from the leaf, but the relationship between particles with different sizes and properties is still uncertain.

Bawden (F. C.) & Pirie (N. W.). **Some effects of freezing in the leaf, and of citrate in vitro, on the infectivity of a Tobacco necrosis virus.**—*J. gen. Microbiol.*, 4, 3, pp. 482–492, 1 graph, 1950.

Experiments with the Rothamsted tobacco necrosis virus [see preceding abstract] suggest that much virus in intact tobacco leaves becomes infective only by means of a mechanism that is started by mincing the leaves and is disordered by freezing. The infectivity but not the serological activity of the virus is lost on exposure to

0·02 to 0·01 M neutral citrate; the extent of the inactivation is influenced by the temperature, pH, duration of exposure, concentration of virus, and presence of salts and other substances. Similar processes could influence the infectivity of the virus in sap and may do so in the leaf.

Grushevoi (S. E.). Допустимая восприимчивость Табака к черной корневой гнили. [Admissible susceptibility of Tobacco to black root rot.]—Агробиология [*Agrobiology*], *1950*, 2, pp. 75–82, 1950.

Work carried out from 1945 to 1947 by the Pan Scientific Institute for Tobacco and 'makhorka' [*Nicotiana rustica*], Krasnodar, U.S.S.R., on the resistance of tobacco varieties to black root rot (*Thielaviopsis basicola*) [*R.A.M.*, 20, pp. 86, 87, 88] showed that these fall into four groups (based on the intensity of multiplication of the pathogen as determined by the number of chlamydospores developing under favourable conditions). (1) Highly resistant, comprising the Indian 'makhorka' variety Hockooh, *Nicotiana glauca*, and some other *N.* species. (2) Resistant; after some time the pathogen reached the 'admissible infection norm' below which the concentration of the causal organism under favourable conditions is not able to cause infection of susceptible varieties. Varatik 26, Trapezond L, and Malovata belong to this group. Numbers of chlamydospores counted in 1947 in 1 ml. of seed-bed substratum in which Trapezond L seedlings were grown repeatedly under very favourable conditions for disease development, were between 720 to 4,280 in the spring and 630 to 1,740 in the summer. In a seed-bed substratum relatively slightly infected (1,000 chlamydospores in 1 ml.) the numbers of chlamydospores present when three resistant varieties were grown were: Varatik 26 in the spring of 1946 420 and in autumn 480; in 1947, 362 and 294, respectively. Infection in both spring 1946 and autumn 1947 was 0·02 per cent. For Trapezond L the numbers of chlamydospores were 510, 690, 416, 281, and infection 0·2 and 0·5 per cent. for the same periods, while in Malovata the corresponding figures were 600, 660, 667, 378; and 0·3 and 0·2 per cent. (3) Slightly susceptible, to which class belong Lyubek 44 and Trapezond 1867; plants raised on heavily infected substratum are not markedly affected. (4) Susceptible varieties, such as Trapezond 93, on which the fungus multiplies with extreme rapidity.

In the pre-war years at the Goryatch-Klyutchev State Farm, Krasnodar district, the susceptible Trapezond 93 suffered serious losses from *T. basicola*. From 1943 to 1947 Trapezond L, resistant to black root and also free from tobacco mosaic virus [ibid., 20, p. 90; 24, pp. 167, 400], was grown in rotation with clover; yield losses were eliminated and soil infection was greatly reduced, approaching in all fields the 'admissible norm'. When the susceptible Trapezond 93 was grown in one of the plots in 1946 there was only 0·96 per cent. infection.

Martin (W. J.). **The role of fresh-market Tomato fruits in the dissemination of Phytophthora infestans.**—*Plant Dis. Reptr*, 34, 8, p. 236, 1950. [Multilithed.]

Although no late blight (*Phytophthora infestans*) [*R.A.M.*, 29, p. 203] was reported on autumn crops of potatoes and tomatoes in Louisiana in 1949, or on the spring crop of potatoes in 1950, the disease developed in June, 1950, in a small tomato planting near Lockport. Investigations showed that tomatoes imported from the Tampa Bay district, Florida, and sold locally were probably the source of infection, as fruits originating from this area contained the viable fungus.

Trotter (A.). **Il 'cancro del Castagno' nella Campania ed il problema della ricostituzione dei castagneti.** [Chestnut canker in the Campania and the problem of the reconstitution of the Chestnut groves.]—*Ric. Ossvz. Divulg. fitopat. Campania ed Mezzogiorno* (*Portici*), 11, pp. 19–28, 1 pl., 1949. [Received July, 1950.]

Chestnut canker (*Endothia parasitica*) [*R.A.M.*, 29, pp. 372, 545] has been

reported recently from the Sorrentino peninsula and from the region of Mt. Santangelo. It was widely prevalent in the province of Benevento in 1947. It has spread from the mountainous part of Partenio to the higher parts of some of the valleys. This continued spread leaves small hope that the disease will remain confined to the localities at present affected. In the Campania the disease is found from 300 to 400 m. above sea-level to 700 m.

The reconstitution of the groves must be considered [ibid., 27, p. 589]. In groves used for timber the normal 12 to 16 years' course should be curtailed and no seedlings left. In nut groves the affected branches should be removed and the wounds disinfected, or the trees should be used for timber. In areas not over 700 m. *Corylus* should be grown, and at greater altitudes beech.

Crandall (B. S.). **The distribution and significance of the Chestnut root rot Phytophthoras, P. cinnamomi and P. cambivora.**—*Plant Dis. Reptr*, 34, 6, pp. 194–196, 1950. [Multilithed.]

The author reviews from the literature the reported host records of *Phytophthora cinnamomi* and *P. cambivora*, and points out that past confusion in the identity of these pathogens has led to a number of misdeterminations. Recent work in Spain and Portugal [*R.A.M.*, 29, pp. 234, 390], however, has allowed a distinction to be made between the two species and it now seems clear that *P. cambivora* is restricted to chestnut and related *Castanea* spp., whereas *P. cinnamomi* has a wide host range which, according to a revised review of the literature, now includes oak (*Quercus robur* and *Q. suber*), birch, *Cedrus atlantica*, *Abies nordmanniana*, *A. pectinata*, and *A. sibirica*. It now appears that in southern Europe *P. cinnamomi* has played a greater part in the chestnut root rot problem than was formerly realized and is probably the major cause of the death of chestnuts in the more southerly regions. The known host range can be used as a criterion of the safety of planting or introducing tropical, subtropical, and temperate zone plants. In the United States there is now additional assurance that *P. cambivora* will not attack birch or Douglas fir [*Pseudotsuga taxifolia*], but stands and nurseries of the latter must be closely watched, as this host is susceptible to *P. cinnamomi*, and it grows to a considerable extent within the climatic areas in which the fungus occurs naturally. *Q. suber*, extensively introduced into the United States, is also within its range.

Parrot (A. G.). **L'Oïdium des Chênes (Microsphaera alphitoides Grif. et Maublanc) au Pays basque français.** [The *Oidium* of Oaks (*Microsphaera alphitoides* Grif. & Maublanc) in the French Basque Provinces.]—*Bull. Soc. Hist. nat. Toulouse*, 83, 3–4, pp. 223–229, 1 map, 1948.

The distribution of oak mildew (*Microsphaera alphitoides*) in the Basque Provinces of France [cf. *R.A.M.*, 14, p. 190] is indicated and particulars are given of specific susceptibility to the disease. Much of the information is borrowed from a paper by E. Foëx entitled 'L'invasion des Chênes d'Europe par le blanc ou Oïdium' in *Rev. Eaux For.*, pp. 338–349, 1941. The highly susceptible *Quercus tozza*, the predominant species in the local forests 50 years ago, has been virtually eliminated by the disease, aided by the practice of pollarding. Less susceptible are *Q. robur*, *Q. sessiliflora* [*Q. petraea*], *Q. pubescens*, *Q. dentata*, *Q. prinus*, and *Q. alba*. *Q. brutia*, *Q. austriaca*, *Q. conferta*, *Q. macrantha*, *Q. tinctoria* [*Q. velutina*], and *Q. rubra* [*Q. borealis*] are tolerant of infection, while *Q. cerris*, *Q. phellos*, *Q. imbricaria*, *Q. macrocarpa*, *Q. ilicifolia*, *Q. coccifera*, and *Q. palustris* are very resistant. It is recommended that every native oak succumbing to the mildew should be replaced by one of the American species *Q. borealis* or *Q. palustris* as a means towards the rehabilitation of the forests.

Pesante (A.). **Su una malattia della Quercia rossa (Quercus rubra L.).** [On a disease of red Oak (*Quercus rubra* L.).]—*Ann. Sper. agr.*, 4, 3, pp. 439–451, 11 figs., 1950. [English summary.]

In an avenue of red oaks (*Quercus rubra*) [*Q. borealis*] about 15 years old at Turin, a few had a vertical depression on the trunk 5 to 6 cm. wide, commencing a short distance from the collar and extending either to a little below the commencement of the branches or along one or more of them. The dead cortex along the depression was cracked and lacerated. Sometimes there was an apparently healthy zone between the depression on the trunk and on the branches but in it the wood was brown. Along the main and smaller branches the band became less characteristic. Sometimes there were two longitudinal fissures and sometimes the margins met and ran together along the branch for some distance, the depression then resembling the cracks caused by frost injury. When the tree is seriously affected the twigs wither before the band develops and the leaves are shed prematurely.

Small black pycnidia were observed consistently on the dead bark. The fungus isolated from them produced the typical longitudinal depression on five healthy trees 50 days after inoculation. After 79 days pycnidia appeared on the dead bark identical with those originally developed. The parasite invaded both cortex and wood, killing all the tissues involved. The pycnidia which formed in a plectenchyma varied from 200 to 370 μ in diameter. The conidia, mostly hyaline and continuous, but sometimes brown, and either continuous or bicellular, both types being present in the same pycnidium or separately, measured 25 to 32 by 13·7 to 17·5 (mostly 30 by 16·2 to 17·5) μ. The hyaline conidia germinated normally and were probably immature. Until a specific determination is made the fungus is assigned to the genus *Botryodiplodia*.

Wester (H. V.), Davidson (R. W.), & Fowler (M. E.). **Cankers of Linden and Redbud.**—*Plant Dis. Reptr*, 34, 8, pp. 219–223, 2 figs., 1 diag., 1950. [Multilithed.]

Of 12 species of *Tilia* surveyed in the National Capital Parks of Washington, D.C., eight were affected by one or two of four different types of canker. Type 1 was the largest (often 6 to 12 in. in diameter) and most injurious, occasionally girdling and killing large leaders. It occurred on the native American species *Tilia americana*, *T. heterophylla*, and *T. neglecta*. Type 2, of minor importance, occurred only on one *T. cordata* and one *T. europaea* tree. Type 3 was found only on young *T. europaea* trees growing under adverse conditions. Type 4 was common on *T. petiolaris* and *T. tomentosa*. Although small, this canker appears to weaken trees when numerous.

Isolations from type 1 cankers commonly yielded the *Dothiorella* stage of *Botryosphaeria ribis* [*R.A.M.*, 29, pp. 587, 589] and in one case *Diplodia* [*Botryodiplodia*] *theobromae* [ibid., 18, p. 788; 28, p. 163]. Inoculations with the two pathogens isolated from *T. neglecta* type 1 canker induced cankers on *T. neglecta* (most susceptible), *T. cordata*, *T. americana*, *T. platyphyllos*, and *T. europaea*. In cross-inoculation tests *Botryosphaeria ribis* isolates from cankered eastern redbud (*Cercis canadensis*) [ibid., 29, p. 589] and those from lime tree type 1 canker both caused cankering of *C. chinensis* and *C. canadensis*, and the redbud cultures produced cankers readily on *T. neglecta*. It appears that *B. ribis* is probably the agent of type 1 canker, although *Botryodiplodia theobromae* may also be involved.

It is suggested that the lime tree cankers are caused by one or more strains of *B. ribis*, and that the different canker types are characterizations of host response to the fungus. Under Washington conditions the highly resistant European species (*T. platyphyllos*, *T. europaea*, and *T. dasystyla*) should be grown.

Diller (J. D.) & Davidson (R. W.). **Cucurbitaria elongata associated with a canker of Honeylocust in Ohio.**—*Plant Dis. Reptr*, 34, 8, p. 224, 2 figs., 1950. [Multilithed.]

A canker disease on honey locust trees (*Gleditsia triacanthos*) was first observed in one locality near Urbana, Ohio, in 1939 and from then onwards spread to new growth on these trees. Fruiting bodies of *Cucurbitaria elongata* or the pycnidial state (*Hendersonia* sp.) have been consistently associated with the cankers. *C. elongata* has frequently been found on dead twigs of black locust (*Robinia pseudo-acacia*). Greenhouse inoculations of *G. triacanthos* and *R. pseudo-acacia* seedlings induced no cankers.

Waterman (Alma M.) & Cash (Edith K.). **Leaf blotch of Poplar caused by a new species of Septotinia.**—*Mycologia*, 42, 3, pp. 374–384, 5 figs., 1950.

A leaf blotch on plantation trees of hybrid poplar clones and on *Populus trichocarpa* and *P. fremontii* in the eastern United States, causing early defoliation, is characterized by small, brown spots up to 1·5 to 2 in. in diameter on young developing leaves in the early spring. The spots enlarge, become grey in the centre and have an irregular margin. On the lower leaf surface white sporodochia 80 to 500 μ in diameter appear on the dark brown veins and white masses of conidia develop concentrically on the upper surface. White fans of radiating hyphae are frequently formed along the margin of the blotch under the upper cuticle. The conidia, borne on branched conidiophores, are hyaline, ellipsoid, at first unicellular, 12 to 15 by 6 to 9 μ, later 1- to 3-septate, constricted at the central septum and breaking into 2-celled sections before germination. Two-celled conidia are 15 to 25 by 4 to 7 μ and 3- to 4-celled conidia 30 to 45 by 4 to 7 μ. The black, angular, elongate or circular, flat sclerotia measure 3 to 5 by 1 to 2 mm. Spermodochia are composed of groups of verticillately branched, hyaline spermatiophores arising from a central stalk. The spermatia are 1·5 to 2 μ in diameter, often adhering in chains or masses.

The apothecia, which so far have occurred only in culture on sterilized sand, are single or caespitose, tough fleshy, long stipitate, shallow cup-shaped with a depressed, slightly plicate centre, 2 to 7 mm. in diameter and 1 to 2 mm. deep. The stipes are 1 to 2 cm. long by 1 mm. thick, slender, and contorted and spirally twisted. The asci are 125 to 135 by 6·6 to 8·5 μ; ascospores hyaline, ovoid, smooth, asymmetrical, 10·2 to 13·2 by 4 to 5 μ, paraphyses numerous, branched 20 μ below the apices, 1 to 15 μ thick. The fungus is described as *Septotinia populiperda* n.sp.

In glasshouse pathogenicity tests on two clones of the hybrid *Populus charkowensis* × *P. trichocarpa* ascospore inoculations induced typical leaf blotches which in two to four weeks produced sporodochia and conidia from which the fungus was reisolated.

Příhoda (A.). **Účast hub na odumírání Kleče (Pinus mugo Turra) v Jeseníkách.** [Fungi associated with die-back of the Mountain Pine (*Pinus mugo* Turra) in Jeseníky.]—*Lesn. Práce*, 28, 2–3, pp. 70–93, 10 figs., 1949. [French summary.]

The die-back of cultivated *Pinus mugo* trees in the Jeseníky mountains in northern Moravia, Czechoslovakia, has been observed for several decades. In the area between the mountains Šerák and Praděd, the author found the following parasitic fungi associated with the decline. A species of *Coleosporium* [*R.A.M.*, 19, p. 375; 25, p. 47] was widespread in the summer of 1948, attacking needles of healthy, vigorous plants. One-half to two-thirds of the one-year-old needles were destroyed by *Hypodermella sulcigena* [ibid., 18, p. 490]. Older needles were markedly thinned, probably owing to previous infections by the pathogen. *H. sulcigena* often occurred in association with *Lophodermium pinastri* [ibid., 17, p. 567] and *Crypto-*

mela allescheri, the combined attacks killing many plants. In the areas where most trees were dying or dead there were several healthy, apparently resistant plants, and it is suggested that seed from these should be used in a breeding programme.

HUBERT (E. E.). **Rootrots of the Western White Pine type.**—*Northw. Sci., Wash.*, 24, 1, pp. 5–17, 1 diag., 1950.

The following fungi were found associated with rots of western white pine [*Pinus monticola*] in the area extending from Priest Lake to Clearwater River, Idaho, during an intensive survey in 1949: *Armillaria mellea*, *Poria subacida* [*R.A.M.*, 29, p. 392], *P. weirii* [ibid., 29, p. 188], and *Fomes annosus*. The cultural characters of the fungi are summarized and the symptoms useful in their recognition are described and tabulated.

SIGGERS (P. V.). **Possible mechanism of variation in the imperfect stage of Scirrhia acicola.**—*Phytopathology*, 40, 8, pp. 726–728, 1 fig., 1950.

In the author's studies at the Division of Forest Pathology, Bureau of Plant Industry, United States Department of Agriculture, Saucier, Mississippi, on monoconidial cultures of *Scirrhia acicola*, the agent of pine brown spot needle blight [*R.A.M.*, 29, p. 130], germ-tube fusions were observed between two cells of the same conidium and apparently also between two cells of different conidia. Hyphal fusions occurred in the marginal zone of growth of a monoconidial culture and they were also effected on the agar surface between hyphae from different cells of the original conidium [cf. ibid., 12, p. 316]. Evidence was obtained of the occurrence of a similar process in nature.

The conidia of *S. acicola* are multicellular and normally triseptate. On germination they enlarge and germ-tubes develop from the individual cells—generally one per cell. In May, 1937, a transfer from a month-old stock culture in cold storage showed masses of an apparently new kind of spore. A culture started on the following 19th September and kept for nearly a month in a refrigerator contained large numbers of these unicellular, spheroid bodies. In another culture similarly treated, except that two spores had been placed on the agar, all gradations were present between normal conidia and others that had divided, under the prevailing environmental conditions, at the septa. Since such conditions do not obtain in nature, the phenomenon is of no significance as a possible medium of variation in *S. acicola*. In June, 1937, several of the unicellular, spheroid bodies were transferred singly to van Tieghem cells and then to tubes of malt extract agar. The examination of some of the cultures after six months' storage in a refrigerator revealed no spores or similar bodies, but a raised mycelial mat had formed in each tube. Hyphal growth was slow and toruloid in contrast to that in conidial cultures.

BOYCE (J. S.). **A note on Leptostroma hedgcockii Dearn.**—*Plant Dis. Reptr*, 34, 8, pp. 228–229, 1 fig., 1950. [Multilithed.]

Leptostroma hedgcockii [*R.A.M.*, 8, p. 66], the conidial state of *Hypoderma hedgcockii* [ibid., 6, p. 126; cf. also 12, p. 254], was collected on green needles of slash pine (*Pinus caribaea*) near Callahan, Florida. The perfect state has been found in Florida or other States on the same host, *P. clausa*, *P. echinata*, *P. palustris*, *P. rigida*, and *P. virginiana*, but the conidial state is more common. The snow-shoe-shaped conidia are borne in sporocarps similar to the hysterothecia. The writer's collection of *L. hedgcockii* differs from the fungus described by Dearness in that many conidia are distinctly two-celled. Septations occur near the narrow ends. A few conidia germinated in distilled water drops within 36 hours at room temperature.

Milbrath (J. A.) & Young (R. A.). **Root rot of Chamaecyparis.**—*Newslett. Nurserym.* 60, p. 4, 1949. [Received December, 1950.]

Much of this information on root rot of *Chamaecyparis* spp. (*Phytophthora lateralis*), which causes severe annual losses in Oregon and Washington, has already been noticed [cf. *R.A.M.*, 21, p. 276]. The most satisfactory means of control in nursery stock is to use disease-free propagating stock and plant in soil in which *Chamaecyparis* has not previously been grown. Otherwise a long rotation should be practised. Chemical dips or soil drenches give only temporary protection since the secondary roots may be infected when they grow beyond the protected zone. *Thuja orientalis* var. *aurea conspicua*, *T. occidentalis* var. *pyramidalis*, *T. plicata*, *Juniperus prostrata*, *J. excelsa*, and the *ericoides*, *torulosa*, and *tetragona aurea* varieties of *C. obtusa* are resistant to root rot. Tests are under way to establish a more definite host range of the fungus and to develop a practical chemical control of the disease.

Espinosa Bustos (M. R.). **Estudios botánicos. 1. Un hongo uredinal parasito del Pehuén (Caeoma sanctae-crucis Espsa. nov. sp.).** [Botanical studies. 1. A rust fungus parasitic on Pehuén (*Caeoma sanctae-crucis* Espsa. nov. sp.).]—*Bol. Mus. nac. Chile*, 24, pp. 65–79, 1949. [Abs. in *Biol. Abstr.*, 24, 7, p. 1945, 1950.]

A description is given of *Caeoma sanctae-crucis* n.sp. on leaves of *Araucaria araucana* in Chile.

Příhoda (A.). **Bělochoroš měkký—Leptoporus mollis (Fr. ex Pers.) Pilát na Moravě.** [White, soft conk—*Leptoporus mollis* (Fr. ex Pers.) Pilát in Moravia.] —*Lesn. Práce*, 28, 1, pp. 37–38, 1949.

In June, 1948, the author found on a living spruce trunk on the mountain Vozka (1,377 m.), Jeseníky, Czechoslovakia, a sporophore identified by A. Pilát as *Leptoporus* [*Polyporus*] *mollis*. In October further specimens were collected in the same locality on several dead, completely rotted spruce trunks.

Schulze (B.) & Theden (Gerda). **Zur Kenntnis des gelbrandigen Hausschwammes Merulius pinastri (Fries) Burt 1917.** [On the yellow-edged house fungus *Merulius pinastri* (Fries) Burt 1917.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F., 2, 10–11, pp. 187–189; 12, pp. 213–126, 6 figs., 1948. [Received June, 1950.]

Merulius pinastri [*R.A.M.*, 27, p. 302], formerly very rare as a house fungus, has spread considerably in Berlin buildings during recent years, causing much damage. A survey is given of the incidence in various parts of the city from 1941 to 1948, and the morphological characters described.

Scheffer (R. P.). **Anthracnose leafspot of crucifers.**—*Tech. Bull. N.C. agric. Exp. Sta.* 92, 26 pp., 4 figs., 2 graphs, 1950.

Anthracnose, caused by *Colletotrichum higginsianum* [*R.A.M.*, 14, p. 486], is one of three leaf spot diseases which inflict serious losses on turnip, Chinese cabbage, and Tendergreen mustard (*Brassica perviridis*) in North Carolina. *Alternaria* leaf spot, caused by at least two species of *Alternaria* [loc. cit.], and white leaf spot (*Cercosporella albomaculans*) [ibid., 28, p. 263] may occur singly or in association with anthracnose, and epiphytotics of the single diseases or the destructive complex are not uncommon. Warm, wet weather is most favourable for the development of *C. higginsianum*.

The anthracnose lesions [ibid., 14, p. 486] appear on leaf blades, petioles, stems, and seed pods and vary somewhat on the different hosts. These include (in decreasing order of susceptibility) Chinese cabbage, turnip, mustard, radish,

broccoli, swede, kale, Brussels sprouts, kohlrabi, cabbage, and collard. No resistant turnip or Chinese cabbage varieties were found. Southern Giant mustard was highly resistant. *Brassica* species 161429 from the Orient was immune. The results of seed transmission tests showed that radish (the only species tested) can transmit *C. higginsianum* in the seed. It was confirmed that the fungus overwinters in diseased leaf refuse [loc. cit.].

C. higginsianum produces numerous rod-shaped, hyaline, one-celled, orange-cinnamon to clay-coloured conidia in minute acervuli which are scattered over both upper and lower surfaces of leaf lesions. Three distinct cultural strains have been observed, all pathogenic. When different strains are grown in the same Petri dish, apparent mating reactions take place, resulting in dark bodies resembling immature perithecia, suggestive of the behaviour of *Glomerella*. *C. higginsianum* grew better on potato dextrose agar and on oat agar than on several other media tested. The optimum pH for growth in culture lies between 5 and 7·5. Colony growth and spore germination occur over the temperature range of 5° to 36° C., with the optimum at about 28°.

In field tests carried out in 1948 at McCullers, North Carolina, on artificially infected Wong Bok Chinese cabbage, 4–100 spergon spray gave the best control (2·8 visual rating on a scale 0 to 10) and was significantly better on infected turnips than other materials; other effective materials were 2–100 dithane Z–78 (4·5), 2–100 zerlate (4·5), and 2–100 fermate (4·8).

Stoll (K.). **Über die Alternaria-Schwärze der Kohlarten.** [On the *Alternaria*-blackening of Brassicas.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F. 2, 10–11, pp. 174–178, 1948. [Received June, 1950.]

A disease of cauliflower seed plants, provisionally designated pod necrosis, recurs annually in the Magdeburg district of Germany, and causes seed losses of up to 95 per cent. Isolations from the affected pods yielded an as yet unidentified species of *Alternaria* [*R.A.M.*, 13, p. 204; 28, p. 248], and in this connexion the author surveys the literature on the species of the genus recorded on *Brassicae* up to 1941. Species of *Alternaria* on *Brassicae* appear to be without specialization as regards host or host parts. They are generally weakly to strongly pathogenic, but there are also secondary invaders of dead tissues. This group includes *A. tenuis*, the pathogenicity of which has not yet been confirmed on *Brassicae*.

Raleigh (G. J.). **Molybdenum deficiency in Dunkirk silty clay loam.**—*Science*, 112, 2911, pp. 433–434, 1950.

In the dry October of 1949 the author observed cauliflower whiptail due to molybdenum deficiency [*R.A.M.*, 28, p. 494; 29, p. 393] in a strain trial on the higher part of a plot of Dunkirk silty clay loam (pH 4·9) near Ithaca, New York. Varieties of the Super Snowball type showed marked symptoms, while Improved Holland Erfurt (Snowdrift) was practically free from them. In a greenhouse experiment Super Snowball plants grown in streel drums with soil from the affected plot developed whiptail, while those which received ammonium molybdate (at the rate of 1 lb. to the acre) remained healthy. Different moisture treatments had little effect on the development of the disorder. In the field cauliflowers also showed a marked response to molybdenum. In 1950 practically all the cauliflower planted in the area not supplied with molybdenum were unmarketable.

Bant (J. H.), Beaumont (A.), & Storey (I. F.). **Hot-water treatment of Broccoli seed.**—*J. nat. agric. adv. Serv.*, 9, pp. 43–46, 1950.

As a result of serious losses (50 to 80 per cent.) the hot-water treatment of broccoli seed against *Phoma lingam* [*R.A.M.*, 24, p. 259; 27, p. 343] was organized in the winter of 1946–7 in the Leeds–Wakefield area by the Horticultural Department of

the West Riding A[gricultural] E[xecutive] C[ommittee], and the weight of seed treated rose from 65 lb. in that season to 612 lb. in 1949–50. A fee of 5*s*. per lb. for the first 5 lb. and 2*s*. 6*d*. per lb. for the remainder is charged. The average reductions in germinative capacity caused by the treatment for seed harvested in 1946, 1947, 1948, and 1949 were, respectively, 17, 4, 10, and 6 per cent. Germinative capacity and the reduction due to treatment are closely related to the rainfall during August and September. Reduction due to treatment is usually greatest in the latest maturing strains, and a trial test should be made before treating the bulk of a grower's seed. Even if seed is brought to low germination by treatment it is better to use this than untreated. The best time to treat seed was found to be in the year of harvest, and treated seed is best for saving, germinating as well as seed untreated after two years' storage. Very little risk attaches to submitting seed to treatment twice. The control given by the hot-water treatment appears to have been at least 99 per cent. effective. Plants from seed treated for only 15 minutes developed 20 per cent. infection in one instance; where the reduction in germination is severe the period of treatment may be reduced from 25 to 20 minutes, but its effectiveness is then somewhat impaired.

Sylvester (E. S.). **Serial transmission of Beet-mosaic virus by the green Peach aphid.**—*Phytopathology*, 40, 8, pp. 737–742, 1950.

In experiments at the University of California, Berkeley, on multiple feeding and serial transmission of the beet mosaic virus by the green peach aphid [*Myzus persicae*: *R.A.M.*, 28, p. 610], individuals selected at random from a non-infective population were placed in a vial for a mean starvation period of 2·2 hours, and then allowed to feed for 20 to 30 seconds on a virus source before transference to a healthy beet seedling for a 10-second test feeding, this procedure being modified so as to give varying numbers of infection feedings and test feedings.

From an analysis of the tabulated results it appears that, although the total number of viruliferous aphids (119 out of 300, or 39·7 per cent.) was relatively high, the total number of plants infected (170 out of 1,650, or 10·3 per cent., a mean of 1·43 per aphid), was comparatively low. Regardless of the number of feedings allowed, 83 (70 per cent.) of the viruliferous aphids were capable of infecting only one plant of the series fed upon, 23 (19) infected two plants, 11 (9) three, and only two (1·6) four. It would seem, therefore, that the aphid's feeding mechanism carries one or more factors that not only limit the charge of virus it is possible to acquire, but also the number of infections that a given individual can produce.

The results of a further experiment indicated that, once the infectivity potential of a given aphid is satisfied in the initial infection feeding, subsequent feeding periods on a virus source do not materially influence the level of infectivity.

Stoddard (E. M.) & Zentmyer (G. A.). **Control of damping-off with 8-quinolinol.**—*Plant Dis. Reptr*, 34, 8, pp. 236–237, 1950. [Multilithed.]

The results of experiments conducted by the Connecticut Agricultural Experiment Station and the University of California demonstrated the effectiveness of 8-quinolinol [*R.A.M.*, 28, p. 181] and its derivatives for the control of pre-emergence damping-off of pea seeds. The benzoate at 1 and 2 gm. per 940 gm. soil resulted, respectively, in 84 and 92 per cent. emergence, and the sulphate (at 2 and 4 gm.) 84 per cent. compared with 0 and 4 per cent. for the untreated. The material applied in aqueous solutions to lettuce, spinach, *Petunia*, *Antirrhinum*, and celery seedlings also proved effective for the control of post-emergence damping-off.

Brown (J. G.). **Diseases of Carrots.**—*Bull. Ariz. agric. Exp. Sta.* 227, 19 pp., 10 pl., 1950.

In this useful bulletin descriptions are given of the incidence, mode of infection,

and symptoms of various fungal and bacterial diseases affecting carrots in Arizona, together with the control measures for each disease and suggestions for storage.

Fulton (J. P.). **Studies on strains of Cucumber virus 1 from Spinach.**—*Phytopathology*, 40, 8, pp. 729–736, 1950.

Six isolates of cucumber virus 1 [cucumber mosaic virus] collected from field-grown spinach [*R.A.M.*, 23, p. 423; 24, p. 216; 25, p. 326] in Arkansas and designated as strains A, B, C, D, E, and F were fully tested at the State Agricultural Experiment Station.

Strains C and E were readily distinguishable from each other and the rest of the isolates on a symptomatological basis. For instance, strain C rapidly proved lethal to cowpea and produced prominent, necrotic local lesions on *Zinnia elegans* var. Lilliput in contrast to the systemic green mottle typical of infection by the other strains. Strain E formed local lesions on cowpea and the Alaska variety of garden pea and was unable to infect bean (*Phaseolus vulgaris*). Strains A, B, D, and F differed among themselves primarily in the severity of the symptoms they caused. Thus, strain F was consistently more pathogenic to pea than the other isolates, while the effects of B were milder than those of the remaining strains on most of the host plants. No difference between A and D was evident on these hosts but one was manifest in the reactions induced by these two strains on spinach. On the susceptible spinach varieties the only markedly distinctive symptoms of rapid yellowing and death were produced by strain C. All the strains caused 100 per cent. infection of the susceptible varieties (Grand Noble, King of Denmark, Long Standing Bloomsdale, Dark Green Prickly Seeded, Juliana, Viking, and Viroflay), but varied in their pathogenicity to the two resistant ones (Old Dominion and Virginia Savoy). For example, strains B and C infected only 8 per cent. of Virginia Savoy plants as compared with 20 per cent. of Old Dominion, while the corresponding figures for A and E were 18 and 25, respectively. On the other hand, strain F attacked 45 to 50 and D 100 per cent. of both varieties. The symptoms induced by strain D on the two resistant varieties were more severe than those resulting from infection by the same strain on the seven susceptible ones. A yellow spotting appeared on the inoculated leaves of young plants of resistant varieties in four to six days; the centre turned yellow and the plant usually died within 15 days. In older plants, which often withstood the shock of initial infection, the growing points developed into small rosettes of narrow, distorted leaves.

The identity of all six spinach isolates as strains of cucumber mosaic virus was demonstrated by means of Price's cross-protection test [ibid., 14, p. 812], using cowpea and *Z. elegans* as hosts. The thermal inactivation point for all the strains was found to lie between 65° and 70° C.

Shulindin (A. F.). Поражаемость фузариозом Чечевицы при весеннем и летнем посеве. [*Fusarium* infection of Lentils sown in the spring and summer.]—Агробиология [*Agrobiology*], *1950*, 2, pp. 144–147, 2 figs., 1950.

Experiments were carried out by the Agricultural Institute, Stavropol, U.S.S.R., in 1948 and 1949 to determine the resistance of various lentil varieties to a species of *Fusarium* [*R.A.M.*, 11, p. 282] in naturally infected plots. Symptoms were inconspicuous in very young seedlings, but growth was inhibited after 12 to 18 days; later most of the leaves were smaller than healthy ones, abnormally dark green, and close to the stem. Subsequently the diseased plants wilted. The development of plants infected after sprouting is delayed, they remain mostly sterile, or produce only a few pods with small, often under-developed seeds.

The conidia of the fungus were most abundant in the root cortex, 1 to 5 cm. under the soil surface, but almost absent in the lower root parts. The infected roots of some young plants had brownish-red lesions, but numerous conidia were observed

in tissues which had no external symptoms. Conidia developed poorly in stem tissues and none were found on pods or seeds.

No immune varieties were observed. In June, 1948, at the bud stage, the most resistant variety was Kievskaya with 10·69 per cent. infection, followed by Lentil 20 with 14·29 per cent. In 1949 the conditions were most favourable for the development of the pathogen. The winter was relatively warm and the fungus overwintered well. Heavy rains from the end of May continued through June and July, and during these months all lentil varieties were killed.

In 1947 an early flowering strain of Lentil 20 from the Astrakhan–Bazarsk district, Azerbaidzhan, was sown separately and tested for resistance in June, during the flowering stage. Plants with small seeds had only 0·77 per cent. infection, large-seeded ones 14·29 per cent., and medium-seeded 76·82. In 1949 the small-seeded plants, designated Lentil 1, were tested again; they developed 32·67 per cent. infection compared with 100 per cent. on Petrovskaya 4/105.

Tests in 1948 and 1949 demonstrated the considerably lower infection rates in summer-sown plants. In 1948 the spring-sown Bukharskaya, Petrovskaya 4/105, and Stepnaya 11 had 27·72, 67·52, and 21·25 per cent. infection, the respective rates for the summer-sown being 17·39, 6·43, and 5·71 per cent. In 1949 spring-sown Petrovskaya 4/105, Stepnaya 244, Tarelotchnaya, and Lentil 1 had 100, 100, 100, and 32·67 per cent., the summer-sown 9·51, 7·74, 9·27, and 4·49 per cent., respectively.

Wilson (R. D.). **A field response of Rock-Melons to molybdenum.**—*J. Aust. Inst. agric. Sci.*, 15, 3–4, pp. 118–121, 3 figs., 1949. [Received June, 1950.]

Sydney Market rockmelons (*Cucumis melo*) growing in soil of pH 5·5 at Wetherall Park, New South Wales, in 1948, were found to be suffering from molybdenum deficiency [cf. *R.A.M.*, 29, p. 396]. The chief symptoms were stunting of affected vines and leaf chlorosis and marginal necrosis, especially of the older leaves. Applications of a solution of crude (45 per cent.) sodium molybdate at the rate of 1/3 gm. of pure sodium molybdate in 6 oz. tap water per hill resulted in all the vines having uniformly dark, healthy leaves after 6 weeks. In a further test all plants treated with sodium molybdate at 0·1 and 0·01 gm. in 5 oz. water had improved leaf colour after seven days.

McKeen (C. D.). **Soft rot in Peppers and its transmission by the Corn borer.**—*Plant Dis. Reptr*, 34, 6, pp. 179–181, 3 figs., 1950. [Multilithed.]

In 1949 soft rot of [chilli] peppers (*Erwinia carotovora*) [*R.A.M.*, 27, p. 507] was widespread in most pepper fields in south-western Ontario and caused heavy losses, up to 80 per cent. of the fruits being destroyed in two fields. Healthy green sweet peppers were surface sterilized and placed in aerated containers with and without corn borer [*Pyrausta nubilalis*] larvae from peppers showing either no soft rot or only the incipient stage and from maize stalks [ibid., 29, p. 504]; other pepper fruits were aseptically punctured and 50 per cent. were subsequently inoculated with *E. carotovora*. In five days soft rot developed round 84 [85 in text] and 35 per cent. of the entrances made by larvae from pepper and maize, respectively, and in 100 per cent. of the wounded, inoculated fruits. Corn borer control is essential for the prevention of the disease.

Leyendecker (P. J.). **Blossom-end rot of Pepper (Capsicum annuum L.) in New Mexico.**—*Phytopathology*, 40, 8, pp. 746–748, 1 fig., 1950.

The blossom-end infection described by Leonian as a feature of chilli stem and fruit blight (*Phytophthora capsici*) in New Mexico [*R.A.M.*, 2, p. 101] has not been observed under field conditions by later workers [ibid., 12, p. 112; 14, p. 344]. Additional studies on the disease were facilitated by an epiphytotic in the same

State in 1947, when the fruits were completely covered with yellowish-tan sporangiophores within 12 to 24 hours and desiccation and mummification ensued in the course of the next 12. Early in the same season, as well as in 1948 and 1949, the fruits presented symptoms identical with those attributed by Leonian to *P. capsici*. Small, watersoaked spots, later expanding and becoming sunken, straw-coloured, and parchment-like, appeared at the tip of the fruits. No pathogenic fungi were recovered from the affected tissues. The same symptoms have been described by Higgins in connexion with blossom-end rot, a physiological disease of chilli [ibid., 4, p. 649]. It appears, therefore, that the symptoms referred by Leonian to *P. capsici* were, in fact, the field manifestations of blossom-end rot, which were not reproducible in the greenhouse. The discrepancies between his observations and those of workers in other States can thus be readily explained.

McClure (T. T.). **Anatomical aspects of the Fusarium wilt of Sweet Potatoes.**—*Phytopathology*, 40, 8, pp. 769–775, 2 figs., 1 diag., 1950.

In further studies at the University of California, Berkeley, on the sweet potato wilt caused by *Fusarium oxysporum* f. *batatas* [*F. bulbigenum* var. *batatas*: *R.A.M.*, 29, p. 285] the comparative anatomy of healthy and diseased Porto Rican Red plants was investigated. The basal wound of a sweet potato sprout normally develops a callus which covers the severed xylem by overgrowth, but this process is suppressed when the stele becomes infected by *F. bulbigenum* var. *batatas*. An auxiliary xylem, developed centripetally from an internal cambium, is frequently found in diseased plants and may be the cause of the stem-splitting commonly associated with the wilt.

When the fungus enters by way of a severed root the pattern of vascular discoloration closely resembles that of the primary xylem, even where the secondary xylem is also involved. Circumferential spread of infection in the xylem is limited by the radial tiers of living xylem parenchyma cells which are normally present in the xylem and resist invasion until they are finally killed. Tyloses formed in advance of the fungus constitute an effective barrier in the vessels in which they occur. The barriers are circumvented by the passage of the organism through bordered pits into unobstructed xylem elements.

Lindeberg (G.). **Phenol oxidases of the cultivated Mushroom Psalliota bispora f. albida.**—*Nature, Lond.*, 166, 4226, p. 739, 3 graphs, 1950.

In studies carried out at the Molteno Institute, Cambridge, it was found that the mycelium of the cultivated mushroom, *Psalliota bispora* f. *albida* (*P. campestris*), produces laccase, and the fruit bodies a carbon monoxide-sensitive polyphenol oxidase [cf. *R.A.M.*, 29, p. 45], whereas in the rhizomorphs a mixture of both enzymes is formed.

Gallay (R.), Staehelin (M.), Wurgler (W.), & Leyvraz (H.). **La dégénérescence infectieuse existe-t-elle dans notre vignoble?** [Is infectious degeneration present in our vineyard?]—*Rev. romande Agric., Vitic., Arboric.*, 6, 6, pp. 43–45, 6 figs., 1950.

In further studies on infectious degeneration of the vine [court-noué] in Switzerland [*R.A.M.*, 27, p. 62; 29, p. 456, and next abstract] it was observed that sickly Chasselas, Rouge de la Loire, Hybrides Seibel 5455, and Seibel 7053 all showed numerous double nodes, fasciations, asymmetrical leaves, characteristic variegation, and the presence of endocellular cordons [ibid., 27, p. 348].

Two distinct forms of disease were present, one type being without variegation and the plants bushy. In 1948 healthy and diseased Chasselas scions were grafted on to healthy stocks, Riparia × Rupestris 3309 and Riparia × Berlandieri Téléki 5.C. In 1949 the young vines were set in a plot in which only healthy vines had

been grown and also in places where the affected vines had been partly eradicated. The results obtained showed that on both stocks all the scions taken from the affected vines developed into plants which were sickly in comparison with those from the healthy, and regularly reproduced in the young vines the anomalies present in the parent. They had an abnormally high number of double nodes and fasciations. The characteristic variegation was transmitted only by the scions from plants exhibiting this symptom. These results show that at least two forms of degeneration are present in Swiss vineyards, both transmissible by grafting, one with variegation and the other without.

PEYER (E.). **Ansteckende Abbaukrankheiten bei Reben.** [Infectious diseases among Vines.]—*Schweiz. Z. Obst- u. Weinb.*, 59, 16, pp. 294–297, 4 figs., 1950.

With reference to the report by Gallay and collaborators of the detection of vine court-noué in the Lausanne area [see preceding abstract], the most conspicuous symptoms of the disease are briefly described, so that suspected cases in the Zurich region may be promptly notified to the Wädenswil Experiment Station or the Cantonal Vine Commissary.

WILLIAMS (P. H.), EBBEN (MARION), HOWLES (R.), GROSSBARD (ERNA), OWEN (O.), & MESSING (J. H. L.). **Plant diseases. Chemical problems.**—*Rep. exp. Res. Sta. Cheshunt, 1949*, pp. 24–47, 64–66, 3 pl., 2 graphs, 1 diag., 1950.

In this report [cf. *R.A.M.*, 29, p. 199] P. H. WILLIAMS describes pure-culture studies to ascertain factors affecting the growth and survival of *Didymella lycopersici* in the soil. These indicated that the fungus will grow over a wide range of moisture content, but does not penetrate the soil very deeply, and that the presence of fresh wheat straw in the soil favours its development. The fungus survived for at least 114 days in both steamed and unsteamed soil. Juice extracted from tomato plants whether crude or filtered, autoclaved or not, caused pycnidia to develop more abundantly on agar media than without juice where they developed in one tube only, though production with juice was not invariable; juice sterilized by filtration gave the best results. Pycnidia were always most numerous where the mycelium had collapsed, but in some tubes they were moderately abundant under the mycelium. Other evidence indicated that the factor which stimulated fruiting on wheat straw differed from that present in tomato juice. Of various vitamins of the B complex tested only biotin had any effect on growth on agar slopes; with 0·01 μg. per 100 ml. growth was slightly better than in the control and there was greater production of carbonized hyphae; with 0·02 μg. the effect was more marked, but with the highest concentration (0·04 μg.) growth did not quite cover the slope; no effect was noted on fruiting.

When seeds of the American tomato varieties Simi, Southland, Essar, and Riverside, reputed to be resistant to *Verticillium albo-atrum* [ibid., 18, p. 825; 20, p. 37; 24, p. 89; 29, p. 540], were grown in pots and inoculated with cultures of the fungus under the roots, only Essar remained uninfected.

Tomato plants growing under normal glasshouse conditions were examined at fortnightly intervals by MARION EBBEN for brown root rot [ibid., 24, p. 484]. The root lesions were of five main types. (1) Lesions caused by *Colletotrichum atramentarium* [ibid., 22, p. 378; 24, p. 389] were not found until the beginning of June. The cortex was completely rotten, leaving a brittle vascular cylinder on which sclerotia were usually present. These lesions occurred on roots of all sizes except the fine fibrous rootlets, and sometimes extended for several cm. along the root. *C. atramentarium* formed 28 per cent. of the total isolations. (2) Pale brown, superficial lesions varied from very small round spots to brown patches several mm. in diameter. (3) Darker lesions on larger roots were probably a later stage

of the second type. (4) Severe lesions, not seen until the middle of July, and only on the largest roots, were corky, swollen areas generally several cm. long and girdling the whole root. (5) Decay of the cortex at the base of the stem at soil level and just below [cf. ibid., 24, p. 78]. In the early stages the lesions appeared as brown, dry patches on the stem; later the whole stem base became girdled by a black cortical rot. The evidence indicated that root size may be one factor determining the type of lesion and that rotting of the smaller roots is continually counteracted by the development of new ones, which in turn may rot; the larger roots are seldom completely rotted.

Other fungi frequently isolated were *Fusarium* spp., an unidentified fungus K producing only grey, aerial mycelium, and *Chaetomium cochliodes* [cf. ibid., 11, p. 593; 25, p. 413]; among species isolated less often were *Volutella ciliata* [ibid., 27, p. 114], *Petriella asymmetrica*, and *Myrothecium roridum* [ibid., 28, p. 31]. *C. cochliodes* was associated chiefly with brown lesions, and later in the season occasionally with basal rot; *Colletotrichum atramentarium* with brown lesions and basal rot; K with corky roots in the last four months of the season; and *P. asymmetrica* with brown lesions. In inoculation experiments on tomato seedlings *C. atramentarium* seemed less effective against the roots than *Chaetomium cochliodes*, *P. asymmetrica*, and K. These fungi when present in the soil are probably partly responsible for root rotting, acting either pathogenically or as secondary saprophytes.

Tests by R. Howles showed that smokers of non-filter-tipped cigarettes and pipes, particularly those who roll their own cigarettes, and the worker who keeps the pruning knife near tobacco can all introduce tobacco mosaic virus infection to the tomato crop [ibid., 14, p. 662; 19, p. 679]. Spraying tomato plants once a week with 1 per cent. tannic acid considerably retarded the spread of tomato aucuba mosaic [strain of tobacco mosaic virus] by contact; when one third of the controls was infected, spread in the sprayed plants was only 30 per cent. of this. Covering the hands and trimming knife with a paste, with or without tanning, reduced the number of local lesions caused by tomato aucuba mosaic on *Nicotiana glutinosa*.

In studies on the production of antibiotic substances in the soil Erna Grossbard showed that soil centrifugates exhibited antibiotic activity similar to that of patulin but much weaker. The production of an antibiotic substance by *Penicillium patulum*, as estimated by assay against *Bacterium mycoides*, *Bact. carotovorum* [*Erwinia carotovora*], *Phytophthora parasitica*, and *Thielaviopsis basicola* in completely or partially sterilized soil [ibid., 29, p. 200] needs only a source of carbohydrate to be added to the soil, all other nutrients required for antibiotic production by this fungus being present. *Aspergillus terreus* also produced an antibiotic substance in sterilized soil, but was less efficient in this respect than *P. patulum*, the presence of which proved non-injurious to tomato seedlings [cf. ibid., 26, p. 220]. *Streptomyces griseus* antagonized *Phytophthora parasitica*. From the rhizospheres of healthy tomato seedlings were isolated two *Penicillium* spp. and one actinomycete all antagonistic to *P. parasitica in vitro*, which have not yet been encountered in the rhizospheres of diseased seedlings.

In nutritional experiments on seven varieties of chrysanthemum O. Owen and J. H. L. Messing found that in the absence of magnesium the flower buds opened early, the size of the blooms particularly of Cheshunt White was reduced, and the colour was pale, Rose Harrison being most affected in this respect. The absence of boron caused rolling, twisting, and curling of the ray florets in all varieties, more marked in some varieties than others and in some producing incurved blooms on varieties normally reflexed. All coloured varieties showed loss of colour, while flowering was retarded for periods ranging from two to six weeks; Rose Harrison was an exception, the blooms opening two weeks before those in any other treatment, including the control.

NEERGAARD (P.). **14 Årsberetning fra J. E. Ohlsens Enkes plantepatologiske Laboratorium 1 August 1948–31 Juli 1949.** [Fourteenth annual report from the J. E. Ohlsen phytopathological laboratory 1st August, 1948 to 31st July, 1949.]—23 pp., 3 graphs, 1950. [English and Esperanto summaries.]

The samples of horticultural seeds tested during the period covered by this report [cf. *R.A.M.*, 28, p. 510] numbered 6,035. Bean [*Phaseolus vulgaris*] contaminants included *Botrytis cinerea* and *Colletotrichum lindemuthianum*, in 125 and 85 lots, respectively, out of 127. *Alternaria brassicicola* was widely represented in the crucifer samples, being detected, for instance, in 68 out of 89 lots of cauliflower, 47 out of 61 of white cabbage, 52 out of 105 of radish, 13 out of 16 of Brussels sprouts, 29 out of 48 red cabbage, and 31 out of 49 of Savoy. *A. brassicae* and *A. raphani* were found, respectively, in 23 and 56 lots of radish. Two out of 11 lots of dill (*Anethum* [*Peucedanum*] *graveolens*), one from Denmark and one from Sweden, were infected by *Stemphylium radicinum*, not hitherto recorded as pathogenic on this crop, and five by *Passalora kirchneri* (Hegyi) Petr. *S. radicinum* also occurred in 75 out of 192 lots of carrot and in eight out of 26 of celery, on which it is rarely encountered. *Septoria petroselini* was isolated from 19 out of 27 lots of curled and from 18 out of 23 of root parsley, while 19 lots of celery contained *S. apii*. *Ascochyta pisi* occurred in 98 out of 145 lots of peas. Pathogens of flowers included *Phoma trachelii* in six out of ten lots of *Campanula medium*, *Alternaria cheiranthi* sensu Wiltsh. in 16 out of 25 lots of wallflower [ibid., 25, p. 582; cf. also 26, p. 14], *A. dianthicola* in 13 out of 43 lots of carnation [ibid., 25, p. 580], and *A. zinniae* [ibid., 28, p. 510] in one out of two lots of *Gentiana acaulis* imported from Switzerland and one out of 14 of cineraria of French origin (both new hosts), as well as in 56 out of 76 of *Zinnia elegans*.

Pleospora calvescens [loc. cit.] was detected in all six lots of opium poppy (*Papaver somniferum*) examined, and in all seven of its var. *paeoniflora*, in eight out of nine of *P. rhoeas*, in two out of 14 of *P. nudicaule*, and in the single lot of *P. mursellii* submitted.

New records for Denmark (besides those already mentioned) are *Ascochyta oleracea* on cabbage seeds and mosaic [virus] of *Hippeastrum* [ibid., 8, p. 177]; *Centrospora acerina* [ibid., 26, p. 133] was observed on nursery plants of *Primula veris* (a new host).

MANNING (H. L. G.). **Report of the Senior Botanist.**—*Ann. Rep. Dep. Agric., Uganda, 1947–1948*, Part II.—pp. 12–27, 2 diags., 1950.

In this report [cf. *R.A.M.*, 29, p. 79] dealing with work in the Kawanda area it is stated that in breeding for resistance to cotton blackarm (*Bacterium* [*Xanthomonas*] *malvacearum*) [ibid., 30, p. 24, and below, p. 157] transference work involving the B_2 gene was continued. B 181 again showed the greatest resistance to *Verticillium* wilt [*V. dahliae*: cf. ibid., 29, p. 560 and below, p. 156] during the season, while BP 52 was also highly resistant.

In a trial of five varieties of cassava resistant to mosaic [see next abstract] one, No. 36, yielded, at six months, at the rate of 7·8 tons per acre.

Annual Report East African Agriculture and Forestry Research Organization, 1949.—44 pp., Nairobi, [? 1950].

In the plant pathology section of this report (pp. 13-21) [cf. *R.A.M.*, 29, p. 350] R. F. W. NICHOLS records that 350 cassava hybrid clones showing great promise of resistance to brown streak [ibid., 29, p. 399] and mosaic viruses and of high quality and quantity of root production were selected from the 1949 harvest. A group of F_1 *Manihot melanobasis* hybrids were very highly resistant to brown streak and it may be possible to introduce mosaic resistance by triple hybridization. Eight of 60 clones in the 1948–9 replicated trials did not contract mosaic and two of these

possessed high brown streak resistance. H. H. Storey and Mrs. A. K. Ryland report that the virus diseases of groundnuts can be differentiated into two groups: rosette and mottle. They have all been established by grafting in the groundnut variety Natal Common in the greenhouse. The mottle group has been transmitted to a high proportion of plants by mechanical inoculation, using the method of Kassanis [ibid., 29, p. 71], and the rosette virus to a low proportion. The latter is readily transmitted by aphids. Posnette's method of insect transmission [ibid., 26, p. 384] was used successfully with groundnut seeds, and rosette disease was diagnosed on the developing plants 12 to 20 days from the start of the test feed with *Aphis craccivora* (formerly *A. laburni*). There are indications that aphis lines of differing origin have different abilities to transmit, that single adult aphids, both winged and wingless, can infect a plant, and that the virus is of the persistent type.

A field experiment at Serere Experiment Station fully confirmed that the closest spacings of groundnut plants [ibid., 29, p. 10] reduced losses from rosette. Statistical analysis of this and past experiments showed that close spacing has a real effect in reducing the number of rosette infections per unit area of field. The plant pathology section has agreed to be responsible for the initial introduction and maintenance of groundnut breeding material and for resistance tests with the rosette virus; 36 varieties grown from South American seed, including several strains of the Nambiquarae type, have been passed to the Overseas Food Corporation at Kongwa for field trials.

Breeding experiments with *Cicadulina mbila*, the vector of maize streak virus [ibid., 29, p. 614], have been resumed [ibid., 19, p. 207]. Active and inactive races have been obtained [ibid., 17, p. 160] and further work on breeding streak-resistant maize from seed stored since 1940 may be continued.

D. Rudd Jones reports that the incidence of a pith necrosis in six-month-old clove seedlings in six nurseries varied from 4 to 40 per cent. and from 24 to 68 in 18. The condition is probably physiological. In connexion with work on the sudden death disease of cloves (pp. 39–40) physiological studies by F. J. Nutman have shown that the stomatal mechanism is affected at an early stage in the disease, leaves from suspect trees having significantly smaller stomatal aperture than healthy ones. Water uptake of the affected trees is not reduced.

D. Rudd Jones (pp. 20–21) states that the canker disease of cypress caused by *Monochaetia unicornis* [ibid., 28, p. 444] has proved serious in *Cupressus macrocarpa* over a wide range of sites in Kenya. It has reached epidemic level in *C. lusitanica* at sites confined to the east of the Rift Valley where ground mists persist and the rain periods are April to June and November to December. Badly affected areas all have a rainfall of over 50 in. Infection occurs most commonly at branch crotches where bark tissue has accumulated. Wounding is not necessary for infection. The disease also occurs in *C. arizonica*, *C. benthami*, and *C. sempervirens*. The resistance of various species is being tested. *Armillaria* root rot [*A. mellea*: ibid., 15, p. 261; 28, p. 200] attacks *Cupressus* spp., *Pinus* spp., *Grevillea robusta*, *Widdringtonia whytei*, *Araucaria cunninghamii*, and *Acacia melanoxylon* in the Kenya plantations, but is only serious in the high rainfall areas. The disease spreads almost entirely by root contact, but in one plantation stumps contracted infection apparently from airborne spores following thinning.

Plant diseases.—*Agric. Gaz. N.S.W.*, 61, 8, pp. 403–406, 423, 5 figs., 1950.

Symptoms resembling those of boron deficiency have been observed from time to time on swede turnip, beetroot, and cauliflower on the northern and southern tablelands and the central coast of New South Wales. Cauliflower hollow heart [cf. *R.A.M.*, 22, p. 85] is found in some crops in the Windsor district. The chief symptoms of boron deficiency in cauliflower, sprouting broccoli, cabbage, swede

beetroot, and celery are noted. Applications of 10 to 30 lb. borax per acre are suggested for correcting the deficiency.

Composite spray programmes are given for the control of peach brown rot (*Sclerotinia fructicola*) [ibid., 23, p. 167; 30, pp. 47, 52], leaf curl (*Taphrina deformans*) [ibid., 29, p. 497], freckle (*Cladosporium* [*Fusicladium*] *carpophilum*) [ibid., 23, p. 475; 24, p. 238], and rust (*Puccinia pruni-spinosae*) [ibid., 21, p. 123] on all varieties.

NANCE (NELLIE W.). **Some new or noteworthy plant disease records and outstanding developments in the United States in 1949.**—*Plant Dis. Reptr, Suppl.* 194, pp. 364–380, 1950. [Multilithed.]

A review of weather conditions in the United States during 1949 is followed by a summary of the outstanding plant diseases which occurred [cf. *R.A.M.*, 28, p. 408], the records for the most part being taken from recent numbers of the *Plant Dis. Reptr* or *Phytopathology*. Among 19 new State or host records not already noted in this *Review* are *Puccinia polysora* [ibid., 21, p. 73] on maize along the Ohio River, Indiana; *Glomerella cingulata* [ibid., 29, p. 417] on 10 to 25 per cent. of the fruits on five peach trees at the Tomato Disease Laboratory near Jacksonville, Texas; *Peronospora antirrhini* [ibid., 27, p. 72] on 2 to 3 per cent. of flowering *Antirrhinum majus* plants in a greenhouse near Troy, New York; bacterial blight (*Xanthomonas papavericola*) [ibid., 9, p. 456] common on *Papaver* spp. in flower gardens, cotton root constriction due to physiological causes, and *Polyspora lini* causing browning and stem break of cotton, all in Arizona; *Verticillium albo-atrum* [ibid., 18, p. 67], first isolated from green ash (*Fraxinus pennsylvanica* var. *lanceolata*) and common on elms and maples [*Acer* spp.] in Colorado, and *Chalara quercina* [ibid., 29, pp. 588, 606] on oak in Indiana. New disease records for the United States are: *Septoria* leaf blight of broomcorn (*Sorghum vulgare* var. *technicum*), which affected 100 per cent. of the plants in three fields in Douglas county, Illinois; and *Cladosporium herbarum* on wheat in Kentucky. Cherry rasp leaf virus [see below, p. 167] formerly present only on sweet cherries, was detected on sour cherry in Colorado.

Golf greens in Indiana and the Chicago district in 1949 were affected by *Pythium butleri* [*P. aphanidermatum*: ibid., 12, p. 450] (SHARVELLE & LIKES—*Midwest Turf*, 3, 4, p. 3, 1949). Application of iron sulphate at 1 lb. in 30 gals. water to 5,000 sq. ft. of turf appeared to control the disease.

Plant pathological investigation in the United States.—*Plant Dis. Reptr, Suppl.* 191, pp. 36–118, 1950. [Multilithed.]

The object of this publication, which contains a wealth of information and is the first of a series, is stated in a foreword by P. R. MILLER, to be to bring out the diversity of plant disease problems in the United States and to show the past, present, and possible future effects of investigation on plant disease occurrence and importance. The first is a paper by V. F. TAPKE and R. W. LEUKEL on the forward march of research on cereal diseases and describes the research on stem rust [*Puccinia graminis*] of wheat and the progress made in control of cereal diseases through seed treatment [*R.A.M.*, 29, pp. 94, 96]. H. W. JOHNSON deals with disease research on forage crops in the Bureau of Plant Industry, Soils, and Agricultural Engineering, and surveys the diseases of lucerne, clovers, soy-beans, *Lespedeza*, cowpea, and miscellaneous legumes, hay and pasture grass, and turf. In particular the history and control of blind seed disease (*Phialea temulenta*) [ibid., 29, p. 156] of perennial rye grass (*Lolium perenne*) and soy-bean brown stem rot (*Cephalosporium gregatum*) [ibid., 28, p. 204] are given.

J. B. CARPENTER in a contribution entitled 'Plant Pathology in the Division of Rubber Plant Investigations' gives a detailed account of the symptoms and control, by fungicides or disease resistant clones, of South American leaf blight (*Dothidella*

ulei) [ibid., 26, p. 334; 27, p. 381; 29, p. 384] in tropical America and leaf spot (*Pellicularia filamentosa*) [*Corticium solani*: ibid., 29, p. 432]. He states that it is now feasible in some areas to produce three-component trees (seedling rootstock, high-yielding panel, and disease-resistant top) on a nursery basis, and to distribute them for field plantings. In the case of leaf blight this will eliminate the possible need for field spraying. A few blight-resistant top-working clones are quite tolerant of leaf spot and make fair growth even under severe disease conditions.

W. A. McCubbin deals with plant pathology in relation to Federal domestic plant quarantines under the headings research relations, specimen determination, teaching (in colleges and schools), the extension service which collects facts and figures and passes on information, and the transit inspection system. Eight plant disease problems which have resulted in Federal domestic quarantine legislation are reviewed to bring out their chief relations to the field of plant pathology. These include measures still in force against the movement of rust-susceptible barberry and *Mahonia* into grain growing areas for the control of wheat stem rust. Individual States have taken action against chestnut blight (*Endothia parasitica*) [ibid., 29, p. 390], wheat flag smut (*Urocystis tritici*) [ibid., 24, p. 48], larch canker (*Dasyscypha willkommii*) [ibid., 29, p. 65], and potato wart (*Synchytrium endobioticum*) [ibid., 24, p. 114]. Phony peach virus [ibid., 12, p. 575; 29, p. 34] and peach mosaic virus [ibid., 28, p. 562] are controlled by a practically uniform series of quarantines in the affected states. When it was established that potato powdery scab (*Spongospora subterranea*) [ibid., 7, p. 226] was confined to the cool northern areas, Federal quarantine regulations were revoked. Control of white pine (*Pinus strobus*) blister rust (*Cronartium ribicola*) [ibid., 6, p. 64; 29, p. 65] became a domestic plant problem from the year 1912 and still remains so. The situation in 1949, ten years after the revocation of the Woodgate rust [*Peridermium* sp.] quarantine [ibid., 19, p. 320] has tended to confirm the apparent inertia of the rust and to class it as a pine disease of sluggish habit and minor importance.

B. B. Higgins discusses plant pathological research in Georgia [ibid., 29, p. 604] since the establishment of the Georgia Experiment Station in 1888 and J. H. Miller gives a historical sketch of diseases of forest trees in Georgia. Phytopathology in Maine 1906 to 1949 [ibid., 30, p. 25] is briefly treated by D. Folsom. O. A. Reinking discusses plant disease investigations, particularly those of fruit and canning vegetables, at the New York State Agricultural Experiment Station [ibid., 29, p. 498]. Past and present plant pathology at West Virginia University [ibid., 25, p. 335] is discussed by C. R. Orton and J. G. Leach, respectively. The latter author states that insecticides and fungicides recommended by the University are now available in retail stores in practically every town in the State. Among some of the principal contributions of the department in recent years is the fact that the use of DDT on potatoes has become a general practice and purple-top wilt [aster yellows virus: ibid., 26, p. 412] has ceased to be a disease of economic importance in West Virginia.

Plant pathological investigation in the United States. II.—*Plant Dis. Reptr, Suppl.* 195, pp. 383–518, 2 diags., 1 graph, 1950.

This further group of articles, based on the literature, on plant disease investigation in the United States [cf. preceding abstract], includes papers on post-harvest diseases of fruit and vegetables, by H. T. Cook; vegetable (except potato) disease investigations from 1885 to 1950, by S. P. Doolittle, under the headings of pathological investigations, control by fungicides, seed treatment, and sanitation, and the development of resistant varieties; investigations on potato diseases by the Bureau of Plant Industry, Soils, and Agricultural Engineering, 1910 to 1949, by E. S. Schultz; field and laboratory research on the diseases of hardy fruit crops from 1885 to 1950, by J. C. Dunegan; research on diseases of citrus and other

subtropical fruits from 1886 to 1950, by H. R. Fulton; investigations of pecan, walnut [*R.A.M.*, 29, p. 65], filbert [ibid., 27, p. 299], and tung diseases [ibid., 28, p. 365], by J. R. Cole and P. W. Miller; disease investigations with ornamental crops, by P. Brierley, including the control of basal rot of narcissus (*Fusarium bulbigenum*) [ibid., 29, p. 307 and below, p. 160] and diseases of gladiolus; the history of the development of the Division of Forest Pathology and the principal lines of work, by C. Hartley; the part played by the Plant Disease Survey in plant-pathological investigation [ibid., 29, p. 521], by P. R. Miller; the present position of state quarantines summarized under the various diseases, by W. A. McCubbin; the history of botany and plant pathology at the Alabama Polytechnic Institute [ibid., 17, p. 286], by J. A. Lyle; a brief history of the development of research in plant pathology in Arkansas [ibid., 27, p. 313] from 1887 to 1950, by V. H. Young, and the history of plant pathology in New Jersey, by C. M. Haenseler.

Sartory (A.), Sartory (R.), & Meyer (J.). **Microbiologie pratique.** [Practical microbiology.]—xi+825 pp., 202 figs. (115 col.), 32 diags., 13 graphs, Paris, Librairie Maloine, 1950. Fr. 6,400 with board covers, Fr. 6,000 without.

In this important and well-illustrated manual of practical bacteriology, written primarily from the medical standpoint, there is much of interest to plant pathologists, especially regarding the techniques of isolation, culturing, staining, and serology. Part I deals with general bacteriology including methods, properties, and industrial fermentations; Part II with immunology; Part III with bacteriotherapy, including bacteriophages and antibiotics; Part IV with biological examinations; and Part V with pathology.

Braun (A. C.) & Morel (G.). **A comparison of normal, habituated, and crown-gall tumor tissue implants in the European Grape.**—*Amer. J. Bot.*, 37, 7, pp. 499–501, 1 fig., 1950.

In studies made at the Rockefeller Institute for Medical Research, New York, and at Harvard University, 17 fragments of normal vine stem tissue, 78 fragments of habituated vine tissue, and 43 fragments of bacteria-free crown gall [*Bacterium tumefaciens*: *R.A.M.*, 29, p. 167] vine tumours were implanted into healthy, rapidly growing Aramon vines. The 27 surviving implanted fragments of bacteria-free tissue developed into large, rapidly-growing neoplasms, while the 51 surviving fragments of habituated tissue were more completely controlled by the growth-restraining influences of the host. The 12 surviving normal implants did not increase in size and apparently exerted no stimulating effect on the normal host cells. Therefore, although the growth of the habituated and tumour tissue *in vitro* is similar, there was, in this instance, a pronounced and fundamental difference in their response when grafted to a healthy vine.

Wood (E. J. F.). **The classification of bacteria, with special reference to non-pathogenic Eubacteria.**—*Proc. Linn. Soc. N.S.W.*, 75, 3–4, pp. 195–213, 1950.

In order to study the relationships of bacterial assemblages the author has attempted to provide a determinative, non-phylogenetic classification of bacteria which removes many of the objections to the systems of Lehmann and Neumann (Bakteriologische Diagnostik, 8 Aufl. München, 1930) and of Bergey *et al.* [*R.A.M.*, 29, p. 90]. The bias of the paper is towards general rather than medical bacteriology. The European system is followed in the light of more recent work, while many of the genera set up by the Society of American Bacteriologists are rejected as ill-founded (those based on pathogenicity or pigment production) or unnecessary. The divisions as far as orders follow Stanier and van Niel (The main outlines of bacterial classification.—*J. Bact.*, 42, pp. 437–466, 1941) except for the reduction of the Actinomycetales to Actinomycetaceae. This is not regarded as separate

from the Eubacteriales because of the obvious links between the Coccaceae, *Lactobacillus*, and *Corynebacterium* on the one hand and *Pseudomonas*, the Gram-negative pleomorphic bacteria, and *Corynebacterium* on the other.

Eubacteriales is the only order dealt with and the paper does not go beyond genera, which are defined mainly on morphological grounds. The genus *Bacterium* is accepted as emended by Migula in 1895 and is described as including Gram-negative rods, motile with peritrichous flagella, or non-motile. Gas is not formed from carbohydrates. *Erwinia* appears not to merit generic rank on serological grounds. *Pseudomonas* is described as Gram-negative, non-sporing straight rods, non-motile or motile with polar flagella. Acid is usually produced in glucose broth and a green fluorescent pigment may be present. Parasitism is rejected as a generic character for *Corynebacterium*, which is considered to be related to *Streptococcus*, *Sarcina*, and possibly *Staphylococcus*. *Corynebacterium* as emended by Jensen (Studies on saprophytic Mycobacteria and Corynebacteria.—*Proc. Linn. Soc. N.S.W.*, 59, pp. 19–61, 1934) is accepted, and includes Gram-positive usually non-motile rods, or when motile with polar flagella. It is pleomorphic with club-shaped and coccoid forms and there is some branching. Cystites are common and metachromatic granules or irregular staining characteristic. Carbohydrate fermentation is usually poor and acid formation weak. Snapping cell division gives V, N, and palisade arrangement. The organism is not acid fast. The author states that he has found in *Corynebacterium* an almost continuous gradation of types from those fermenting no carbohydrates to those fermenting many.

McLaughlin (J. H.). **Observations on Cacao in Colombia.—Observations on Cacao in Peru.**—*Cacao Inf. Bull.*, 2, 6, pp. 1–4, 1950.

The most destructive diseases of cacao in Colombia are the pod rots caused by *Monilia roreri* and *Phytophthora palmivora* [*R.A.M.*, 24, p. 272], the combined average annual crop reductions from which are estimated at 30 per cent., but losses up to 80 per cent. have been reported. Of the total reductions in yield from these diseases, C. Garcés Orejuela attributes 65 per cent. to *M. roreri* and 35 per cent. to *P. palmivora*. Witches' broom (*Marasmius perniciosus*) [ibid., 17, p. 81; 23, p. 56] has not yet been found in the principal cacao-producing area of the Cauca Valley, but it occurs in the part of Colombia adjacent to Ecuador. A disease of unknown origin, characterized by the formation of large, wart-like excrescences on the flower cushions, has been observed in the Department of Antioquia.

Many abandoned cacao trees in a banana field about 15 km. from Tingo María, Peru, were severely infected by the three above-mentioned pathogens and a species of *Colletotrichum*. The pod rots and witches' broom are also reported to be rife in the main area of production in the Valley of Convención.

Mead (H. W.), Broadfoot (W. C.), & Machacek (J. E.). **A study of some seed-borne diseases of cereals in Canada. I. Comparison of seed testing methods.**—*Sci. Agric.*, 30, 8, pp. 350–360, 1950.

In comparison of the cereal seed-testing methods used at the Dominion Laboratories of Plant Pathology, Winnipeg, Saskatoon, and Edmonton, 90 samples of wheat, oats, and barley were tested at all three centres in 1942-3 for germination and diseases (including *Helminthosporium sativum*, *H. teres*, *H.* [*Pyrenophora*] *avenae*, *Septoria nodorum*, and *Fusarium* spp.) in non-sterile soil in the greenhouse [cf. *R.A.M.*, 22, p. 92] and on moist filter paper in Petri dishes [*Sci. Agric.*, 16, pp. 175–179, 1935]. For normal germination of oats at Winnipeg, wheat at Saskatoon, and both at Edmonton there was fairly good agreement between the two types of test; otherwise there was very poor agreement, particularly as regards abnormal germination. Correlation between the laboratories was good in the case

of normal germination. There was good agreement between the two tests as regards lesioning determination in some cases, and between the laboratories for wheat and barley, but not oats. Field tests agreed better with the soil ones than with the filter paper test. The gain in germination of 12 samples in the soil test had little or no relation to yield in the field.

In further work in 1943–4, 12 samples of cereal seed were tested in non-sterile soil and sand in cardboard boxes. Agreement between the laboratories was much better than in the first series of tests, both as regards normal germination and lesioning. The results were sufficiently close to suggest that either non-sterile soil or sand might be used for tests. Again there was no correlation between germination as a result of seed treatment [cf. ibid. 30, p. 101] and yield in the field. This method (with some modifications in temperature and moisture control) might prove suitable for testing seed for seed-borne fungi, if a standard medium were used.

Leukel (R. W.). **Chemical seed treatment. Part II.**—*Agric. Chemicals*, 5, 9, pp. 47, 49, 1950.

The author briefly discusses the seed-borne diseases of barley, oats, wheat, maize, sorghum, flax, and rice which can be controlled by seed treatment, and the materials which are most widely used [*R.A.M.*, 29, pp. 364, 381, 413, 431, 549; 30, p. 101]. Treating equipment is described, ranging from home-made hand-operated mixers capable of treating 25 bush. an hour to commercial ones (generally of the gravity type), treating 500 bush. an hour.

Martens (P. H.) & Detroux (L.). **Essais de détermination en laboratoire de la valeur des désinfectants de semences à base de mercure.** [Experiments on the laboratory determination of the value of seed disinfectants with a mercury base.]—*Parasitica*, 6, 3, pp. 88–97, 1950.

Using a previously described method for testing seed-dusting materials in the laboratory [*R.A.M.*, 27, p. 414], the authors studied the F factor (far effect) of numerous mercury compounds [ibid., 29, p. 162] on *Tilletia tritici* [*T. caries*] and *Ustilago hordei* spores. Certain materials showed a high F coefficient; thus, taking the coefficient for ceresan as 1, the highest values were for mercury ethoxybutyliodide (2·94 and 3·19 for the two fungi, respectively), followed by a mixture (5:4) of this compound with mercury ethoxypropyliodide (2·26 and 2·44), mercury ethylophosphate (1·82 and 2·89), and ethyl mercury paratoluene sulphanilide (1·77 and 2·01). Six other preparations gave values of 1 or over.

In most of the products the solution of the mercury compound by water was not a physical reaction, but was accompanied by hydrolytic decomposition. Also, when the fungicide being studied was shaken up in water with agricultural clay soil it was found that the mercury content was reduced by adsorption and occasionally by increased solubility.

In field tests in 1948–9, using artificially infected seed treated with some of the compounds, reduction of infection by *T. caries* for the above-mentioned compounds was 99·1, 98·7, 100, and 100 per cent., respectively. For *U. hordei* the following compounds gave 100 per cent. reduction of infection in both 1947–8 and 1948–9: mercury phenyl acetate plus mercury ethyl chloride (7:1), phenyl mercury urea, mercury methoxyethylsilicate, and ethyl mercury paratoluene sulphanamide.

It is concluded that the amount of mercury in a seed disinfectant or the amount in aqueous solution bears no relation to the fungicidal value. High laboratory F values, a low coefficient of adsorption of mercury by the soil, and efficiency in field test were in reasonable agreement indicating correlation between the coefficients obtained by chemical means and those obtained by biological methods.

25. Beschreibende Sortenliste für landwirtschaftliche Kulturpflanzen 1950. Getreide. [25th descriptive variety list for agricultural plants 1950. Cereals.]—48 pp., Staatliche Kommission für die Zustammenstellung der Sortenliste für landwirtschaftliche Kulturpflanzen in Wageningen (Niederlande), 1950.

This useful compilation comprises important information on the cereal varieties sanctioned for cultivation in Holland by the Dutch General Recognition Service for Agricultural Seeds and Seed Potatoes. Among the winter wheats, Staring [*R.A.M.*, 29, p. 551] is resistant to loose smut [*Ustilago tritici*] and rust [*Puccinia* spp.]; Mendel to *P. glumarum* and *P. triticina* and highly resistant to *U. tritici*; Titan fairly resistant to *P. glumarum* and *P. triticina*; and Blanka resistant to *P. triticina* and quasi-immune from *U. tritici*.

Koehler (B.) & Bever (W. M.). **Oat and Wheat seed treatments in 1950 in relation to dosage, storage before planting, and thoroughness of mixing.**—*Plant Dis. Reptr*, 34, 9, pp. 259–261, 1950. [Multilithed.]

The results of experiments conducted at the University of Illinois, Urbana, demonstrated that new improved ceresan and ceresan M at $\frac{1}{4}$ oz .per bush. completely controlled smut [*Ustilago avenae* and *U. kolleri*: *R.A.M.*, 30, p. 101] in Canadian oats when the seed had been treated a week before planting and stored in closed bottles. Panogen [loc. cit.] (added to the walls of a bottle in which the seed was shaken) also gave good results, but treatments made on a commercial scale were unsatisfactory, because of uneven mixing. The most vigorous plants were those treated with panogen at $\frac{1}{2}$ and $\frac{3}{4}$ oz. with four weeks' storage, and $\frac{3}{4}$ and 1 oz. with one week or one day's storage. New improved ceresan at $\frac{1}{2}$ oz. per bush. impaired germination of Pawnee and Royal wheat seed when the treated seed was stored for three months in closed bottles. Higher dosages increased the damage. Ceresan M was somewhat less injurious, while panogen was even better than ceresan M.

Two new seed protectants.—*Seed World*, 67, 9, p. 45, 1950.

Two new seed protectants are mergamma, a combination wireworm killer and seed disinfectant, and agrox, a phenyl mercury urea disinfectant. Mergamma, developed by Plant Protection, Ltd., England, contains high gamma BHC [benzene hexachloride] and phenyl mercury urea and may be applied dry or as a slurry with ordinary seed-treating equipment. It is said to control wheat bunt [*Tilletia caries* and *T. foetida*], oat smut [*Ustilago avenae* and *U. kolleri*], and barley covered smut [*U. hordei*].

Vallega (J.). **Trabajos genéticos para obtener características especiales tales como resistencia a las enfermedades y plagas. Resultados obtenidos en las investigaciones sobre el potencial patógeno de las especies parásitos que afectan a los cereales, sobre la búsqueda de factores genéticos de resistencia con respecto a las mismas, y lo que estos conocimientos significan para la selección de variedades resistentes a las enfermedades.** [Genetic operations to obtain special characteristics, such as resistance to diseases and pests. Results obtained in investigations on the pathogenic potential of the parasitic species affecting cereals, on the search for genetic factors of resistance to the same, and the significance of this knowledge in the selection of disease-resistant varieties.]—*Foll. misc. Ofic. Estud. esp. Méx.* 3, pp. 214–232, 1950.

Only one of the many diseases which are being studied in connexion with the Argentine cereal crop improvement programme is discussed in this paper, presented at the First Latin-American Conference of Phytogeneticists, held in Mexico City from 26th September to 8th October, 1949, namely, leaf rust of wheat (*Puccinia rubigo-vera tritici*) [*P. triticina*: *R.A.M.*, 28, p. 58 and cf. next abstract]. The

pathogen is widespread, especially in the central wheat-growing area, and its importance is not generally realized. On a susceptible variety the rust was shown experimentally to cause a reduction of 80 kg. per ha. for every 10 per cent. of infection out of a maximum yield of 1,900 kg. The La Previsión 25, Klein Lucero, Sinvalocho, and Klein Orgullo varieties are resistant, at any rate to the most prevalent physiologic races, among which 20 has predominated for the last ten years at least. Together with 49 and 26, it constitutes a group characterized by non-pathogenicity to the Mediterranean and Democrat varieties, as well as to Sinvalocho and other native wheats with the same genes of resistance. The three varieties mentioned are also spared by races 5, 15, 62, 105, 114, and 57, comprising a second group, which do, however, cause very virulent infection of other wheats, including some indigenous types. Though less widely distributed than the races of the first group, those of the second are potentially dangerous, especially 15, which is increasing at an alarming rate.

The factors conferring resistance to *P. triticina* proceed from a series of wheats cultivated since early times in the Rio Plata region, especially a selection, known as 7d, of the Phytotechnical Institute, La Estanzuela, Uruguay. All these types are selections of Barleta and Criollos or Italian hybrids descended from Rieti. Apart from the foregoing, the only active participants are Hope and Chino 466, the latter transmitting to 38M.A. its strong resistance in the field.

Isenbeck (K.) & Rosenstiel (K. v.). **Die Züchtung des Weizens.** [Wheat breeding.]—529 pp., 50 figs., 2 diags., 9 graphs, 1 map, Berlin, Paul Parey, 1950. DM. 22.

This extract from the 'Handbuch der Pflanzenzüchtung', edited by Professors T. Roemer and W. Rudorf, contains, besides much valuable information on various aspects of plant breeding, a section on the selection of wheat for resistance to diseases and pests (pp. 421–462), incorporating the results of studies already noticed from other sources [*R.A.M.*, **17**, p. 476; **18**, p. 195; **25**, p. 494].

Cortázar Sagarmínaga (R.). **Producción de Trigos resistentes a los polvillos colorados (Puccinias) en Chile.** [Production of Wheats resistant to the coloured rusts (*Puccinia* spp.) in Chile.]—*Foll. misc. Ofic. Estud. Esp. Méx.* 3, pp. 220–232, 1950.

The major problem of wheat cultivation in Chile is constituted by the diseases of the crop, especially the rusts, *Puccinia glumarum*, *P. triticina*, and *P. graminis* [*R.A.M.*, **29**, p. 584]. Straib identified the physiologic races of *P. glumarum* occurring in Chile as 30, 37, 38, and 39 [ibid., **16**, p. 524; **17**, p. 665]. Since 1940 there have been two epiphytotics of yellow rust in the central region.

Most of the bread wheats are susceptible to *P. triticina* [see above p. 147, and next abstract], of which seven physiologic races have been identified in 100 Chilean collections [ibid., **26**, p. 150], but the white summer types, such as Capelli, are almost completely resistant. In experiments from 1945 to 1948, inclusive, to determine the efficacy of sulphur dusting [ibid., **27**, p. 467] (1) every three days, (2) weekly, and (3) fortnightly, using two susceptible varieties, Thatcher in the first year and Manitoba in the three others, the following yields were obtained in metric quintals per ha. [1 quintal = 100 kg.]: 1945 (1) 12·9, (2) 11·6, and (3) 10·4; 1946 (1) 16·7, (2) 16·5, and (3) 13·4; 1947 (1) 17·6, (2) 15·1, and (3) 13·8; and 1948 (1) 12·1, (2) 10·6, and (3) 10·9. In the untreated control plots the yields in the four years were 8·8, 14·8, 14·1, and 11·1, respectively. It is clear from these figures that the treatment tends to increase production, notably in a year of heavy infection like 1945. In that year the average yields of resistant and susceptible varieties at an experiment station were 19·5 and 15 quint. per ha., respectively, whereas in 1944, when *P. triticina* was absent, the corresponding figures were 23 and 25, respectively.

P. graminis is of major economic importance only in the region extending northwards from the Province of Ñuble. The population of four physiologic races [ibid., 25, p. 158] has remained static for over nine years. Although at least three of the numerous species of *Berberis* occurring in Chile have been reported by workers in other countries to be susceptible to *P. graminis*, viz., *B. buxifolia*, *B. ilicifolia*, and *B. brachybotrys*, no case of infection on material of native origin has yet been determined. In sulphur-dusting experiments carried out on the same lines as those described above for *P. triticina*, but using the Centenario variety, the following yields were obtained: 1945 (1) 17·9, (2) 13·9, and (3) 11·2; 1946 (1) 18·7, (2) 18·4, and (3) 17·1; 1947 (1) 15·2, (2) 13·1, and (3) 12·8; and 1948 (1) 11·6, (2) 11·4, and (3) 13·8. In the controls the corresponding yields were 9·2, 16·9, 11·8, and 9·2, respectively. As in the case of *P. triticina*, the effects of the treatment were most noticeable in the epiphytotic year of 1945. The average yields at an experiment station of five resistant varieties in 1940 (severe infection), 1941 (mild), 1942 (mild), 1943 (normal), and 1944 (severe) were 29, 27, 12, 19·5, and 7, and those of five susceptible 5, 23·5, 11, 15, and 1·5, respectively. From the results of his studies the author concludes that *P. graminis* is responsible for an average annual reduction of 15 per cent. in the wheat stands of central and northern Chile.

The breeding of wheat for rust resistance in Chile was begun in 1926 by the National Society of Agriculture and in 1929 by the Ministry of Agriculture. Until 1940 the latter body confined its attention almost exclusively to individual selection within the existing native and foreign varieties, whereas the former established a hybridization programme which has already resulted in the production of new varieties resistant to *P. glumarum*, e.g., Enrique Matte, Centenario, and Campesino, and one (Baflo) moderately resistant to *P. graminis*. The main objects of the breeding programme undertaken since 1940 by the Department of Genetics for the area lying between the north and Talca are (*a*) the incorporation into varieties suitable for local cultivation but susceptible to *P. graminis* of resistance to the rust, and (*b*) the procurement of new varieties adapted to the region. Using Thatcher, Kenya, and Santa Catalina as sources of resistance, 32 resistant lines have been obtained and some are in process of testing for productivity. Experiments are also in progress to develop suitable varieties for the zone lying between Talca and El Bio-Bio, where *P. graminis*, though less troublesome than in the north, may cause appreciable damage in seasons of heavy infection.

Resistance to *P. glumarum* is the principal factor to be considered in the breeding programme for the area comprised between El Bio-Bio and the south. This character is present in some degree in General, Vilmorin, etc., and attempts have been made to strengthen it by crossing with varieties of the Lincoyán type and backcrossing. Yield tests with some of the progeny are being carried out.

Vallega (J.). **Razas de las royas de los cereales hallados en el archipiélago de Chiloé.** [Races of the cereal rusts collected in the Chiloé archipelago.]—*Lilloa Rev. Bot., Tucumán*, 21, pp. 169–172, 1 map, 1949. [English summary.]

Specimens of cereals collected in the Chiloé archipelago, Chile, yielded physiologic race 14 of *Puccinia graminis tritici*, race 68 of *P. triticina* [see preceding abstract], race 7 of *P. g. avenae*, and race 1 of *P. coronata*.

Teodoro Enciso (C.) & Ignacio Narváez (M.). **Mejoramiento de la resistencia al chahuixtle en las variedades de Trigo en Mexico.** [Improvement of resistance to rust in the Wheat varieties of Mexico.]—*Foll. misc. Ofic. Estud. esp. Méx.* 3, pp. 18–21, 1950.

In connexion with a review, presented at the First Latin-American Conference of Phytogeneticists, held in Mexico City from 26th September to 8th October, 1949,

of factors limiting wheat production in Mexico and the organization of a programme of breeding for resistance to stem rust (*Puccinia graminis tritici*) [*R.A.M.*, 28, p. 623 and next abstract], the writers tabulate the reactions to the disease and other characters of three groups, viz., (1) varieties well adapted to the prevailing conditions, (2) introduced varieties, and (3) new hybrids with characters of great value for the indigenous system of cultivation.

All nine varieties of group (1), namely, Marroquí 588, Marroquí 426, Mentana, Aguilera, Pelón Colorado, Querétaro, Candeal, Barrigón, and Nativo Sels. 421–1 and 421–8 are susceptible to foliar infection; in the case of the first six, the stems are also attacked, but the three last are resistant in this respect. Of the 10 varieties of group (2), Newthatch, Kenya 9906, Kenya 10866, Supremo 211, Renown, Mida, Timstein M-990, Frontera 209, and Hope are resistant to stem infection, but Perú is susceptible. All but two are susceptible to foliar infection, Supremo 211 being resistant and Timstein M-990 intermediate in its reaction. The stems of the four new hybrids, Chapingo '48', Yaqui '48', Kentana '48', and Nazas '48', are resistant and the foliage susceptible to *P. graminis*.

Stakman (E. C.) & Loegering (W. Q.). **Razas fisiológicas de Puccinia graminis tritici en México.** [Physiologic races of *Puccinia graminis tritici* in Mexico.]—*Foll. misc. Ofic. Estud. esp. Méx.* 3, pp. 24–26, 1950.

The establishment of the North American physiologic races of wheat stem rust (*Puccinia graminis tritici*) pursues a slower course in some regions than in others. For instance, race 56 appeared in northern Mexico [see preceding abstract] in 1934, but not until 1940 was it observed in the centre of the country [*R.A.M.*, 28, p. 329]. It has also been encountered in Guatemala. Certain races common in central and northern Mexico do not seem to exist in the north-east. Such variations in the predominance of physiologic races necessitate studies on their distribution in relation to breeding for resistance to avoid disappointing results, such as the complete susceptibility in the north of varieties of proved resistance in the central regions. F_1 hybrids should be tested for several years in all the areas where it is proposed to cultivate the varieties, or inoculated in plots with all the races of actual or potential local importance. The latter is the more expeditious and economical procedure, but precautions should be taken against the introduction of virulent races into regions hitherto free from them.

Simmonds (P. M.), Sallans (B. J.), & Ledingham (R. J.). **The occurrence of Helminthosporium sativum in relation to primary infections in common root-rot of Wheat.**—*Sci. Agric.*, 30, 10, pp. 407–417, 1950.

Surveys in Saskatchewan in 1943 and 1944 showed wide fluctuations from field to field in the incidence of *Helminthosporium sativum* [*R.A.M.*, 27, p. 229; 28, p. 622] on wheat and barley stubble which was shown to be the main site of colonization of the pathogen. Field samples in 1948 and 1949 confirmed this, conidia being abundant in some fields on the stubble or in the surface soil. Many soil samples contained viable conidia early in the spring. Laboratory experiments confirmed that conidia remain viable for periods up to 23 months in the soil, and it appears that they are a source of primary infections of wheat seedlings. A survey in June, 1949, showed that lesions near the soil surface are common. Seedling infection in the greenhouse was obtained by means of conidial suspensions washed over the soil.

Tests demonstrated that conidial germination was suppressed by the largely bacterial microflora on stubble or in top soil [loc. cit.]. In preliminary experiments in which the soil surface was exposed to ultra-violet light or sunshine, inoculated seedlings tended to have higher infection rates than those in comparable but shaded soils. The results support the hypothesis that light treatments kill or inactivate the antibiotic bacteria without injuring the conidia.

The presence of conidia on or in the surface soil should be considered when devising control measures. Cultural methods and rotations, whereby the antibiosis at the soil surface could be intensified, applications of antibiotic substances directly to the soil surface, or, in some cases, fungicidal treatments, are suggested.

Rusakova (Mme A. A.). Бурая ржавчина на Кахетинской ветвистой Пшенице. [Brown rust on Kakhetinskaya bushy Wheat.]—Агробиология [*Agrobiology*], 1949, 3, pp. 180–182, 1949.

This is a preliminary note on experiments carried out in 1948 by the Scientific Research Institute for Fertilizers, Insecticides, and Fungicides, Moscow, in which the reactions of wheat varieties to brown rust [*Puccinia triticina*: *R.A.M.*, 29, p. 296] were observed. The spring varieties Lutescens 62 and Moskovskaya 48 were severely diseased, the upper leaves having up to 75 to 80 per cent. infection, but Kakhetinskaya bushy wheat was on the whole much more resistant, with only small, local pustules (type 1), though some plants showed high infection. After sugar-beet the plants showed up to 9 per cent. infection on the upper leaves and up to 40 per cent. on the lower. After clover in densely sown plots the rates were lower.

Russell (R. C.). **The whole embryo method of testing Barley for loose smut as a routine test.**—*Sci. Agric.*, 30, 8, pp. 361–366, 1 graph, 1950.

An investigation was made at the Dominion Laboratory of Plant Pathology, Saskatoon, to ascertain whether the percentage infection by *Ustilago nuda* in a sample of barley seed as determined by Simmonds' whole embryo test [*R.A.M.*, 25, p. 258] agrees with field counts of the number of smutted heads in the crop from the same seed stock. All the heads affected with loose smut were collected and the spores germinated to cull out heads affected with *U. nigra*. Percentage infection by *U. nuda* in the different samples varied from 0 to 25 and averaged 3 or 4.

The results showed a high positive correlation between the percentages of infection as determined by visual examination of 475 embryos, of 100 to 200 greenhouse plants, and 800 field plants at Saskatoon and at Indian Head, representing eight barley varieties, the coefficient of correlation being over 0·97 in each instance. In the 29 samples grown in the greenhouse the average infection by the embryo test was 3·77 per cent. and by the growth test 3·81 per cent. In the field samples at Saskatoon the corresponding figures were 3·93 and 3·6, while at Indian Head they were 3·22 and 3·21. The embryo test should prove valuable as a routine test, especially in plant breeding work and the certification of seed barley.

Atkins (J. G.). **Helminthosporium victoriae as a leaf-spotting pathogen.**—Abs. in *Phytopathology*, 40, 8, p. 785, 1950.

In addition to the invasion of seedlings and basal nodes of susceptible oat varieties in Louisiana, *Helminthosporium victoriae* [*R.A.M.*, 28, p. 14] produces on the leaves of ripening plants oval to elongate, grey to brown spots, up to 3 by 1 cm. The conidia arising from these spots differ from the typical ones on the basal nodes in their paler coloration, more uniform length and septation, and slight curvature. Foliar lesions were observed on susceptible varieties before the nodes were blackened or lodging supervened. Nearly all the leaves of plants in the heading or dough stage may be killed by the fungus, either alone or in combination with rust [*Puccinia coronata* and *P. graminis*: ibid., 30, p. 103]. All the isolates of *H. victoriae* were similar in culture and pathogenic on Victorgrain oat seedlings. The inoculation of large plants resulted in the development of foliar lesions like those observed in the field.

Magnitzky (K. P.). Недостаток магния у озимой Ржи на подзолистой супесчаной почве. [Magnesium deficiency in winter Rye on sandy-clay podsol soil.]—Агробиология [*Agrobiology*], 1950, 1, pp. 96–99, 1950.

During fertilizer experiments from 1946 to 1948 on the Lyuberetz experimental plot of the Scientific Research Institute, U.S.S.R., cultivated crops suffered from magnesium deficiency on sandy-clay podsols (4 to 18 mg. magnesium per kg. soil). The symptoms on winter rye [*R.A.M.*, 17, p. 669] developed 15 to 40 days after the appearance of the seedlings in the autumn, and in the spring many plants died.

In 1947–8 rye was sown after potatoes on a plot (pH 4·7) where the yields of various crops had been very low for several years in spite of mineral fertilizers. In plots without additions of magnesium sulphate (60 kg. magnesium oxide per ha.) rye plants developed marked deficiency symptoms, while those which received magnesium sulphate in the autumn were normal. The yield from untreated plots was only 2 z[entner: 1 zentner = 100 kg.] per ha.; for spring-treated it was 6·3 z., and autumn-treated 13·4 z. In treated plots the rye plants ripened 10 to 15 days earlier than in untreated.

The grain yields in 1948 from plots receiving complete fertilizers plus (1) chalk, (2) dolomite, (3) chalk plus magnesium sulphate (30 kg. per ha.), (4) lime, and (5) lime plus magnesium sulphate were, respectively, 3·6, 14·5, 14·6, 6·9, and 13·6 zentner; straw yields were 15·1, 28·6, 32, 19·6, and 32·1. Potato, sugar beet, clover, and lucerne were even more exacting in their magnesium demands, and magnesium applications resulted in even higher yield increases.

Scurti (J.). **Sulla istopatologia del Mais parassitato dall' Ustilago maydis.** [Concerning the histopathology of Maize parasitized by *Ustilago maydis*.]—*Ann. Sper. agr.*, N.S., 4, 5, pp. 827–855, 6 pl., 1 fig., 1950. [English summary.]

Studies on the histopathology of maize plants attacked by *Ustilago maydis* [*R.A.M.*, 29, p. 361; 30, p. 34], carried out at Turin, showed that no tissue changes occurred in the early stages of the life of the plant, but after the first tumours appeared subsequent development was very rapid. The tumour initials consisted of very young cells devoid of mycelium in the periphery of the ground parenchyma of the stem. In the leaves the whole mesophyll was involved. The floral bracts and ovary wall expanded into flattened structures and after fertilization the ovary ceased to develop. Mycelium appeared in the tumours only after some time had elapsed. Two types of mycelium were observed: the first with large isolated hyphae, which stained readily with haematin and were seldom harmful, while the second was composed of fine hyphae, always grouped together, coloured by eosin, and very harmful. The tumours were rich in nucleic acid, especially when young.

Montellano (P.). **Herencia de la resistencia al chahuixtle en el Maiz.** [Genetics of resistance to rust in Maize.]—*Foll. misc. Ofic. Estud. esp. Méx.* 3, pp. 13–14, 1950.

In this paper, presented at the First Latin-American Conference of Phytogeneticists, held in Mexico City from 26th September to 8th October, 1949, the author summarizes the results of hybridization experiments, in connexion with a Mexican maize improvement programme initiated in 1944, with four selections, two resistant and two susceptible to rust (*Puccinia sorghi*). The inheritance of resistance was shown to rest principally on a single pair of Mendelian factors, the dominance of which is incomplete [cf. *R.A.M.*, 18, p. 670].

Niederhauser (J. S.). **Enfermedades del Maiz en México y variedades resistentes.** [Maize diseases in Mexico and resistant varieties.]—*Foll. misc. Ofic. Estud. esp. Méx.* 3, pp. 232–235, 1950.

The three most important diseases of maize in Mexico are the root, stem, and ear

rots, rust (*Puccinia sorghi*) [see preceding abstract], and stunt virus [*R.A.M.*, 28, p. 283]. Resistance to *Fusarium moniliforme* [*Gibberella fujikuroi*], the principal agent of rotting [ibid., 25, p. 72], was shown in inoculation experiments by 24 out of 2,300 lines selected by E. J. Wellhausen for inclusion in his breeding programme [cf. ibid., 28, p. 570].

Studies are in progress to determine the identity of the physiologic races of *P. sorghi* (at least two and probably more) existing in the country, which have induced very divergent reactions in 197 lines used in inoculation experiments.

Maize stunt virus, which is transmitted by cicadas, is widespread and constitutes a potential threat to the crop. Inoculation experiments are planned to determine the reactions to the disease of lines, varieties, and hybrids, which are known from field observations to differ in this respect, and to utilize sources of resistance as a method of control.

Wadsworth (D. F.) & Sieglinger (J. B.). **Charcoal rot of Sorghum.**—*Bull. Okla. agric. Exp. Sta.* B–355, 7 pp., 2 figs., 1950.

Charcoal rot of sorghum (*Macrophomina phaseoli*) [*R.A.M.*, 29, p. 411] occurs in at least 27 States in the warmer parts of the United States. It appears to be most prevalent in the drier regions of the southern Great Plains, but has been found as far north as Douglas county, Oregon. Close spacing appears to increase the incidence of the disease. Determinations of susceptibility have been made annually in Oklahoma since 1940 at the Woodward Experiment Station and since 1942 at the Perkins Experiment Station, and during this period the varieties Tall Red Kafir No. 7, Atlas Sorgo No. 899, Kansas Orange, African Millet, Sumac No. 35038, Sumac No. 1712, and Corneous Sorghum have shown no infection [cf. ibid., 29, p. 207]; Wild Amber Sorgo, Tall White Sorghum No. 787, and Rice Kafir have displayed high resistance. Three forage sorghums, Atlas, African Millet, and Sumac 1712, are widely grown in Oklahoma because of their resistance.

McClean (A. P. D.). **Virus infections of Citrus in South Africa. I. Scaly bark or psorosis of Citrus. II. Tristeza disease of Brazil.**—*Fmg S. Afr.*, 25, 293, pp. 261–262, 1950.

Scaly bark or psorosis [*R.A.M.*, 19, p. 86; 28, p. 511; 29, p. 289] of citrus trees is now only of minor importance in South Africa but it remains a potential danger because of its continued presence. Many nurseries are now using registered parent trees and co-operation between nurserymen and growers should keep the disease in check. There is little doubt that a virus with the same properties as the tristeza virus of Brazil [ibid., 29, p. 300] has existed in South Africa almost as long as the citrus industry [ibid., 27, pp. 131, 419].

Childs (J. F. L.). **Organic vs. copper fungicides for control of melanose.**—*Phytopathology*, 40, 8, pp. 719–725, 1950.

The use of Bordeaux-oil against citrus melanose (*Phomopsis* [*Diaporthe*] *citri*) and scale insects occasionally results in injury and experiments were therefore carried out from 1946 to 1948 at the U.S. Subtropical Fruit Field Station, Orlando, Florida, to determine the relative efficiency of organic and copper-containing fungicides leaving an inconspicuous residue (since any dust increases the scale population) in melanose control on Marsh grapefruit [cf. *R.A.M.*, 25, p. 212], 6–4–100 Bordeaux mixture being used as a standard of comparison. As a class, the performance of the organic fungicides [details of which are given] was inconsistent and in general, the inorganic fungicides, especially the relatively simple copper compounds, proved superior to the organic for the end in view. Thus, Bordeaux mixture, tribasic copper sulphate (52 per cent. copper) at 1½ lb. per 100 gals. plus 100 gm. vatsol O.T., and the cuprous oxides (microatomized copper oxide at 2

lb. plus 100 gm. vatsol O.T. and yellow cuprocide at 1 lb. plus 100 gm. vatsol O.T.) gave uniformly good to excellent control. The low level of residue deposited by the cuprous oxides further tends to reduce the scale population.

DRUMMOND (O. A.). **Notas sôbre o comportamento do 'Limão Rosa' em face da tristeza, verrugose e gomose em Viçosa.** [Notes on the reaction of the 'Pink Lemon' to 'tristeza', verrucosis, and gummosis in Viçosa.]—*Lilloa Rev. Bot., Tucumán*, 21, pp. 1–5, 6 pl., 1949. [English summary.]

It appears from the results of grafting experiments in Viçosa, Brazil, using limão rosa (limão cravo) [the 'pink' (or 'rough') lemon] as a stock for sweet oranges, that the former is reasonably resistant to the 'tristeza' form of root rot [see above, p. 153 and next abstract] and verrucosis (*Sphaceloma fawcettii*) [*Elsinoe fawcetti*: ibid., 28, p. 8] but susceptible to gummosis (58 to 69 per cent.), especially the form caused by *Phomopsis* [*Diaporthe*] *citri* [ibid., 26, p. 130].

DUCHARME (E. P.) & SCHATZ (A. S.). **Sôbre la susceptibilidad del pie de Pomelo a la 'podredumbre de las raicillas' (tristeza).** [On the susceptibility of the Grapefruit stock to 'rootlet rot' ('tristeza').]—*Lilloa Rev. Bot., Tucumán*, 21, pp. 67–75, 4 pl., 1949. [English summary.]

In tests in insect-free houses and out-of-doors at the Concordia Experiment Station, Entre Ríos, Argentina, the 'tristeza' root rot virus [*R.A.M.*, 29, p. 207 and preceding abstract] was recovered from sweet oranges grafted on grapefruit stocks. The symptoms of the disease were also reproduced on trees on grapefruit stocks by grafting on the healthy stocks buds from diseased sweet orange and mandarin trees. Resistance was shown, however, by lemon and grapefruit grafted on grapefruit stocks. On the basis of present evidence, grapefruit should be discarded as a stock for the sweet orange and mandarin.

MALENÇON (G.). **La diffusion et l'épidémiologie de la maladie fusarienne du Palmier-Dattier en Afrique du Nord.** [The spread and epidemiology of the *Fusarium* disease of the Date Palm in North Africa.]—*Rev. Mycologie, Suppl. colon.*, 15, 1, pp. 45–60, 1950.

The baïoud disease of date palms caused by *Fusarium oxysporum* var. *albedinis* [*R.A.M.*, 29, p. 301 and next abstract] is common throughout Morocco and occurs at some points on the borders of southern Algeria, extending in an easterly direction as far as In-Salah. The disease appears likely to be controllable locally in the immediate future, but is more serious when long term effects of the various foci of infection are considered.

The author considers that the climatic and topographical conditions of the Sahara ensure the natural spread of the disease within homogeneous groups of date palms. Man is responsible for its spread to isolated areas by the movement of soil, transplanted shoots, and canes cut from the stalks and timber from the trunk, which, if infected, may under humid conditions become covered by conidia or mycelium, thus ensuring the establishment of an epiphytotic in very remote areas that could not be reached by naturally disseminated spores.

As an endemic the disease affects only a few trees in relation to the total number in a plantation. An epidemic, however, may destroy entire plantings over a relatively large area, dying down again after five, ten, or fifteen years. There is also an intermediate stage when the disease attacks palms but not in sufficient number or with sufficient intensity to be termed an epidemic.

In southern Morocco and in several other localities including Amzoudj, Tissint, and Timesguit, the author has observed that an epidemic generally follows the flooding of an area previously in a state of dryness for several years. Although this may govern the frequency of the epidemics it leaves unexplained the factors

governing their intensity. It is thought that when natural *Fusarium* populations encounter periods of excessive heat or dryness or are compelled to vegetate inside resistant hosts, the more hardy virulent strains survive while attenuated ones are eliminated. The latest analysis indicated that the general index of virulence of the survivors among these populations is in proportion to the rigours suffered. Conversely, vegetation of the fungus under favourable conditions or in hosts with little resistance permits the maintenance and rapid multiplication of attenuated strains of reduced virulence which allow limited root production while maintaining the disease in endemic proportions. The level of this equilibrium determines whether it is an active or quiescent endemism.

The common practice of abandoning palms once the dates have been gathered leads to the development of numerous side shoots depriving the parent stem of the bulk of the nutrients and water and giving the palm a tufted appearance. Once one shoot is attacked by the pathogen the whole clump is affected. The disease, however, does not multiply at once, it may spread at the rate of only one tree per year, so that the visible effects of infection are prolonged for as many seasons as there are parent trees in the clump.

Malençon (G.). **Le 'bayoud'—maladie fusarienne du Palmier-Dattier en Afrique du Nord.** ['Baïoud'—a *Fusarium* disease of Date Palms in North Africa.]—*Fruits d'Outre-Mer*, 5, 8, pp. 279–289, 4 figs., 1950.

Much of the information in this paper, which includes the history, method of infection, symptoms, epidemiology, and control of the baïoud disease of date palms in North Africa caused by *Fusarium oxysporum* var. *albedinis*, has already been noticed from another source [see preceding abstract]. Soil disinfection is an excellent means of safeguarding areas which are directly menaced by the disease. In experiments carried out from 1936 to 1939, 12 to 15 gm. pure cryptonol [ibid., 17, p. 182; 18, p. 579] was injected into the base of the trunks of affected trees. The effectiveness of the treatment decreased in inverse proportion to the amount of disease in the subject. In most cases, however, the progress of the disease was arrested for up to five years during which time additional harvests were obtained which defrayed the cost of the treatments. The effects of the disease are clearly indicated by excellent photographs.

Wardlaw (C. W.). **Armillaria root and trunk rot of Oil Palms in the Belgian Congo.**—*Trop. Agriculture, Trin.*, 27, 4–6, pp. 95–97, 5 pl., 1950.

Root and trunk rot of oil palms (*Armillaria mellea*) [*R.A.M.*, 29, pp. 236, 292] has made rapid progress in some plantations in the Belgian Congo during the past three years, especially in the area between Bumba and Stanleyville. The most rapid destruction occurs on poor, sandy soils. Dead or dying palms are usually in groups of three to six, and from this locus infection may extend to many others.

The rotting of the trunk base may be unilateral, general, or central, and is frequently accompanied by an unpleasant odour. From the rotted tissue which is penetrated by white mycelial mats, decay spreads inwards, causing a typical black streaking of the vascular fibres. During the wet season abundant fructifications develop. Several fungi may be involved in the rotting of the trunk or the leaf-bases. Resistance may account for the fact that in some palms the lesions at the base of the trunk remain localised and dry up; above such cankers a mass of new roots grows down. So far the disease has been observed on *Tenera*, *Dura*, and Deli type palms, and sterile palms.

Control measures include thorough inspections of plantations; elimination of old, infected forest stumps; removal of infected leaf-bases and opening the infected areas to light; application of fungicides and wound dressings; immediate felling of trees which cannot be saved; and ditching and weeding round palms.

Wardlaw (C. W.). **Vascular wilt disease of the Oil Palm caused by Fusarium oxysporum Schl.**—*Trop. Agriculture, Trin.*, 27, 1–3, pp. 42–47, 4 pl., 1950.

Vascular wilt disease of oil palms associated with *Fusarium oxysporum* [*R.A.M.*, 29, p. 507] has been observed in plantations and natural palmeries from Calabar to Benin in Nigeria [ibid., 28, p. 124] and from Brabanta on the Kasai in the southern Belgian Congo to Yangambi on the main river in the north. There can be no doubt that the disease, first reported in 1946 [ibid., 26, p. 103], is of long standing in west and central Africa. Under plantation conditions infected palms may occur singly, in small groups, or in more considerable clumps; blocks have been observed in which 20 per cent. of the palms planted in 1936 have been killed. In some palms, in which the disease is unevenly distributed in the trunk, the sequence of leaf wilting [loc. cit.] may be irregular, e.g., two or three younger leaves above the lowest cycle of old leaves may alone show wilting in the early manifestations of external symptoms, or occasional leaves or groups of leaves scattered through the crown may be affected. Leaves may display a conspicuous yellow or lemon yellow colour, which usually develops first in the distal pinnae and spreads backwards towards the leaf base. In some Nigerian plantations the leaf symptoms are variable; leaves with a conspicuous yellow colour at the end of the rains become less noticeable as the dry season advances, and some of the older leaves become desiccated and brown. According to their position in the crown and the age of the tree, these brown leaves may remain rigid and erect or may break and hang down. In some palms the wilted leaves remain green.

The infected vascular strands may be central, peripheral, or both [ibid., 27, p. 523]. In the root necrotic brown or red streaks appear in the vascular system in close proximity to the trunk and sometimes in the main spreading roots some distance away from the trunk. The presence of the pathogen may cause darkening of the vascular fibres in advance of the actual necrosis of the wood vessels.

The disease is potentially the most dangerous cause of loss to the oil palm industry. At present the only feasible means of control is the breeding of resistant varieties.

Franco (C. M.) & Mendes (H. C.). **Sintomas de deficiências minerais no Cafeeiro.** [Symptoms of mineral deficiencies in the Coffee plant.]—*Bragantia, S. Paulo*, 9, 9–12, pp. 165–173, 11 figs. (5 col.), 1949. [English summary.]

A modified Hoagland's solution, using only one-third of the prescribed quantity of phosphate, was found to be the most suitable medium for the growth of coffee plants intended for mineral deficiency studies [cf. *R.A.M.*, 18, p. 21]. The symptoms induced by the omission from the substratum of nitrogen [cf. ibid., 26, p. 555], phosphorus, potassium, magnesium, calcium, sulphur, and iron are described and illustrated.

Progress Reports from Experiment Stations, season 1948–9.—172 pp. + v, 1 diag., 4 graphs, London, Empire Cotton Growing Corporation, 1950.

In the report from Barberton, South Africa [cf. *R.A.M.*, 29, p. 210], D. Macdonald states that in recent years maize streak [virus: ibid., 29, pp. 10, 614] has spread to areas where previously it was practically unknown, and is now becoming important in middle and especially late season maize plantings. *Verticillium* wilt (*V. dahliae*) of cotton [ibid., 27, p. 473; and above, p. 140] was recorded on four additional farms in the Barberton area in 1948–9. The disease has also been identified in specimens from Magut, and there are indications that it is spreading in this new area. All the strains at present in cultivation are susceptible. G. M. Wickens reports that in plots from which plant debris was removed there was less wilt (9·2, 11·1, 19·8, and 21·6 per cent.) in the following season than in plots on which

debris remained (22·1) or to which more was added (35·3 and 40·9). It appears that leaf debris may, but does not necessarily result in increase of the disease in the following season. In trials B.181 and BP.52 were the most resistant varieties, A.7834 and A.791 next, and A.7261 and M.U.8A least. An unexpectedly high-yielding capacity occurred in areas of relatively high wilt incidence; the yield of MU.8A particularly has been maintained under increasingly severe incidence, e.g., 40·6 gm. seed cotton per plant (mean yield) and 65·4 per cent. mean wilt compared with 46·9 yield and 27·2 wilt for B.181. An explanation, for which there is some evidence, is that some factor lending to increased fertility has led also to increased wilt incidence. Resistant strains have failed to give the expected higher yield. Fertilizer treatments made no difference to the severity of attack by bacterial blight (*Xanthomonas malvacearum*) [see above, p. 140]. In summarizing the main results of experiments from 1946 to 1949 it is stated that the failure to secure at Barberton the difference between resistant and susceptible types based on the criteria used in the Sudan [ibid., 29, p. 465] is probably ascribable to climatic conditions: the combination of high atmospheric temperatures and high soil moisture necessary for the full development of leaf lesions is uncommon. From Uganda [see above, p. 140] J. D. Jameson reports that the relationships between yield and rainfall in relation to blackarm [cf. ibid., 27, p. 183] are best seen in Busoga where the rainfalls in February and August fluctuate about a critical figure and are inversely related to each other. It is only when rain above average in February is followed by falls below average in August that a big benefit results. This happened in 1935, 1936, 1937, and 1940. In Busoga the yield in these years was 50 per cent. greater than that obtained when the combination of rainfall in February and August was less favourable, while in the Teso district the yield was more than doubled. The hypothesis formulated is that while heavy rainfall in August favours the spread of secondary blackarm infection, a close season (February) wet from the beginning favours the rotting in the field of infected debris from the previous crop. In the majority of years the close season may be dry enough to permit an appreciable carry-over of infected debris and when it is largely diseased secondary spread will produce an epidemic in almost any weather. When the disease carry-over is small the August rain is critical. It is also possible that when there is an unusual amount of rain early in the year, and the seed is ginned and stored rather damp, infection on the seed does not endure so long.

Because of lack of success at Kawanda of securing adequate angular leaf spot development for selecting resistant plants all material has recently been planted at Serere [ibid., 29, p. 80]. Very severe symptoms developed in 1948 and it was observed that in resistant material each necrotic spot was surrounded by a greenish yellow halo. In susceptible material the necrotic areas were larger, watery, and black, were surrounded by normal green tissue, and appeared to spread across the veins. Premature leaf-reddening due to interruption of translocation occurred almost invariably where the disease ringed the petiole at the lamina base. These two characteristics of yellow halo and absence of leaf reddening provide a new basis for the selection of B_2-resistant plants given the right conditions after spray inoculation under rainfall.

By reducing the lesion count to a plus or minus observation on the main stem only the author has established three levels of resistance, the lowest corresponding to the absence of B_2, the next to its presence, and the highest to B_2 plus some other factor or factors. H. L. Manning at Kawanda, using this technique, states that statistical analysis of data from 38BP.52 progenies gives 8 with resistance in the class with 3 to 38 per cent. of the plants with one or more lesions; 21 with 39 to 78, and 9 with 79 to 100.

In describing the response of the cotton plant to blackarm damage J. D. Jameson states that invasion of the stem from the cotyledon [ibid., 17, p. 439; 18, p. 23]

causes the greatest damage because it arrests the later development of the sympodial fruiting branches. The damage may not persist after the initial growing period and the inherent ability of the plant to recover is important. Blackarm-resistant varieties should be checked to see that resistance is reflected in yield.

R. R. Anson, at the Gezira Station, Anglo-Egyptian Sudan, reports that from a roguing experiment started in 1947–8 the numbers of plants resistant to leaf curl virus [ibid., 29, p. 507] in the varieties BAR.1730L, BAR.4/5, BAR.4/11, BAR. 4/16, and K1730A were 16, 15, 17, 22, and 20, respectively. Severe primary blackarm infection at the Research Farm was traced to seed inadequately treated with abavit B and not put through the delinting machine. In future a stronger concentration of abavit B is to be used and a delinting machine has been set up. Blackarm-resistant strains significantly outyielded susceptible strains where severe blackarm infection was present. Strains of Domains Sakel highly resistant to leaf curl, which have been obtained, will most probably be replaced by BLR.14/16 resistant to both leaf curl and blackarm.

R. L. Knight states that in a resistance trial at Medani, Evelyn's Sakel, BAR. 14/7, and BLR.14/16 developed 97, 79, and 11 per cent. leaf curl, respectively.

M. F. Rose reports that blackarm was the only noteworthy disease at the Kadugli station. The susceptible pump scheme strain (P.S.S.) and also BAR.SP. 84 showed 100 per cent. infection on 29th September (August plantings), but whereas the former had a mean blackarm grade of 8·7 with marked stem lesions, the latter had only 6·9. Early planted (2nd July) BAR.SP.84 had the low mean grade of 3·7. Early resistant White, an early maturing strain of sesame, is resistant to Marad el Dam disease (*Bacterium* [*Pseudomonas*] *sesami*) [ibid., 26, p. 531; 28, p. 56; 29, p. 212]. In areas of doubtful infection cultivators are warned against the use of the susceptible Red: a limited amount of resistant White seed is available for local distribution.

From the Domira Bay Station, Nyasaland, H. C. Ducker, W. L. Miller, S. H. Evelyn, and M. S. Hastie report that a rainstorm in March accompanied by a high wind caused a general infection of cotton blackarm, which did not cause much damage. Although most of the CL.20–20 derivatives carry B_2 there are real differences in susceptibility. Selection of homozygous resistant strains would be beneficial if the disease ever becomes serious in Nyasaland.

J. V. Lochrie and J. R. Spence report that 'chibble leaf' [ibid., 3, p. 50] appeared for the first time since the Antigua station opened. It occurred in three localities in exposed situations; at the Cotton Experiment Station in a pen manure trial the affected plants were those which received the highest applications during the seasons from 1946 to 1949. The disease occurred during wet and cloudy weather, and the return to normal with high flowering was marked when dry sunny conditions occurred in January. Affected plants were very tall, the internodes of the main stem and vegetative branches being elongated, and the number of nodes on the sympodia reduced, the first internode being elongated. Flowering had practically ceased and flower buds had dried up and blackened early. Mature leaves were thick, rather irregular, and dark green.

Drummond (O. A.). **Notas sôbre a murcha do Algodeiro, causada pelo Verticillium dahliae.** [Notes on a Cotton wilt caused by *Verticillium dahliae*.]—*Lilloa Rev. Bot., Tucumán*, 21, pp. 54–56, 4 pl., 1949. [English summary.]

In this paper, presented at the second South American Congress of Botany on 15th October, 1948, the author describes his studies of cotton wilt (*Verticillium dahliae*) [cf. *R.A.M.*, 14, pp. 87, 629 and preceding abstract], one of the most important diseases of the crop in Minas Gerais, Brazil, which have been in progress since 1940. The most effective mode of inoculation consisted in the placing of the washed roots of 40-day-old seedlings for two to three minutes on 20-day-old pure

cultures of the pathogen on Czapek's agar. The commercial varieties tested contracted 100 per cent. infection, with the exception of Sea Island (*Gossypium barbadense*), which developed 50 per cent. in two consecutive years. Experiments are still in progress on lines suggested by the Department of Genetics, College of Agriculture, with a view to the development of a fixed character of resistance to *V. dahliae*.

The propriety of the distinction between *V. albo-atrum* and *V. dahliae* [ibid., 29, p. 333] is maintained.

Newton (W.) & Bosher (J. E.). **Package measles of Tulips.**—*Sci. Agric.*, 30, 9, pp. 402–404, 1950.

Considerable losses of tulips in Vancouver Island were sustained through a disease termed 'package measles', characterized by an extensive spotting of the leaves and petals after the blooms were wrapped in wax paper for marketing. Condensed moisture within the packages was found to be a contributing factor, but the primary cause was contamination of the blooms prior to cutting during dull humid weather with spores of a form of *Botrytis cinerea* [cf. *R.A.M.*, 29, p. 365] originating from plant debris accumulated beneath the greenhouse benches. Non-contaminated plants developed typical symptoms within 24 hours when sprayed with a spore suspension, cut, wrapped, and held at 45° F. Symptom development in the packages was prevented by spraying the plants prior to cutting with a 0·5 per cent. dithane [ibid., 25, pp. 215, 558].

Caldwell (J.) & Kissick (Edwina). **Varietal response to Narcissus stripe virus.** – *Daffodil and Tulip Yearb.*, 16, pp. 63–74, 10 figs., 1950.

Observations of a large number of *Narcissus* varieties at University College, Exeter, during the growing seasons of 1948 and 1949 showed none to be immune from narcissus stripe disease [narcissus mosaic virus: *R.A.M.*, 22, p. 434; 26, p. 107 and next abstract], and varietal reactions differed considerably. Chlorosis, one of the most widely spread symptoms, varied even in the same variety. The varieties The First and Winter Gold, which usually exhibit marked chlorosis, developed only faint symptoms during the two seasons under review. Weardale Perfection in 1948 showed severe mosaic, while in 1949 the same plants in the same plot had only faint chlorotic markings. Proliferation, the development of small papillose areas on the leaf surface associated with abnormal development of the subepidermal cells, also varies greatly in severity. The leaves of some varieties are distinctly rough, while in others it is difficult to detect. Marked proliferation is exhibited by The Marquis, Wrestler, Mrs. Ernst H. Krelage, Scapa, Princeps, Killigrew, Reynoldstown, Barri conspicuous, Phyllida, and Courage. Field inspection revealed no proliferation in Amir and *N. triandrus* hybrid, but when examined microscopically small cellular outgrowths were found in both varieties. Recognizable proliferations appear to be of two types both of which may be found in the same variety: those having a relatively small number of large cells, and those with a much larger number of smaller cells, all the cells being devoid of chlorophyll. The development of proliferation was not affected by temperature. Severe leaf distortion was noted in Winter Gold, King Alfred, Helios, Sunrise, and Venetia. Flower break, characterized by large whitish patches on the flower, is fairly widespread in groups with yellow perianths and large coronas.

Some varieties, including Wrestler, Weardale Perfection, Grandis, Helios, and especially *N. triandrus* hybrids showed a marked reduction in bulb size and aerial parts of the plant during the 1948–9 growing season. Hybrids of *N. pallidus praecox* are especially susceptible [loc. cit.], while those of *N. tazetta* appear to be much more resistant. Since the classification of *Narcissus* is not a natural one, no consistent reaction can be expected from members of any one group. Stripe is

probably responsible for the disappearance of some of the good, older varieties. Breeders should select little-affected varieties as parents.

Details of the different types of symptom exhibited by the various varieties observed are tabulated.

Beaumont (A.). **Narcissus varieties and their susceptibility to pests and diseases.**—*Daffodil and Tulip Yearb.*, 16, pp. 75–81, 1950.

Of the yellow trumpet narcissi, the Maximus (*Narcissus hispanicus*) and Obvallaris (*N. obvallaris*) groups are highly resistant to white mould (*Ramularia vallissumbrosae*), especially the first group, whereas the Golden Spur group (*N. propinquus* and *N. spurius*) is highly susceptible. Smoulder (*Botrytis* [*Sclerotinia*] *narcissicola*) [*R.A.M.*, 25, p. 203] occurs very rarely on the Emperor group (*N. bicolor*) although it has been noticed on Emperor, Herbert Smith, and Monarch. Trumpet varieties are on the whole resistant to fire (*B.* [*S.*] *polyblastis*) [ibid., 25, p. 453], and have a fair degree of resistance to leaf scorch (*Stagonospora curtisii*) [ibid., 19, p. 97]. M. J. Berkeley and *N. obvallaris* are highly resistant to the last named disease, which also does little or no damage to the Emperor group. The Maximus group is resistant to bulb rot (*Fusarium bulbigenum*) [ibid., 23, p. 344; 29, p. 141], but very susceptible to stripe [narcissus mosaic] virus [see preceding abstract]. Rootplate rot (*Cylindrocarpon radicicola*) [ibid., 14, p. 366] is very rare in the Maximus and Emperor groups. Minister Talma is resistant.

The varieties with *bicolor* trumpets are generally highly resistant to foliage diseases, in particular Princeps, which, however, is subject to stripe. The group is susceptible to *Fusarium* bulb rot, to which Empress is resistant. Rootplate rot has not been observed on Victoria, Mme Plemp, or Princeps.

The white trumpet varieties are susceptible to bulb rots, but they are rarely attacked by foliage diseases, and stripe is of little importance in this group.

The narcissi with large coloured cups are markedly resistant to most diseases. Although stripe is common it does less damage than to the trumpet varieties. Fortune is outstanding for its vigour and disease resistance. Some of the white perianth and Leedsii varieties are extremely susceptible to foliage diseases; Duncan, probably of Maximus origin, is an exception.

The small coloured-cup varieties are also susceptible to foliage diseases, but less than their paler relations. Bulb rots are rare; Seagull and Sunrise are markedly resistant to *F. bulbigenum*. Of the *triandrus* and *cyclamineus* hybrids Silver Chimes is resistant to bulb rots, but very susceptible to fire and white mould. Fire and smoulder have not been recorded on jonquils, which are also resistant to bulb rots and stripe.

Of the *tazetta* group, which is very susceptible to most diseases, the late variety Compressa has a high degree of resistance to leaf scorch. All *tazetta* and *poetaz* varieties are highly resistant to *F. bulbigenum* and probably also to *C. radicicola* and stripe.

All *poeticus* varieties are extremely susceptible to diseases; these are the only ones which develop smoulder in epidemic form and during storage extensive bulb rotting occurs. On the other hand, *F. bulbigenum* is very rare and most stocks are completely free from stripe.

Beaumont (A.). **The effects of the weather on Narcissus leaf diseases.**—*Daffodil and Tulip Yearb.*, 16, pp. 82–83, 1950.

Although narcissus leaf diseases [see preceding abstracts] are widely distributed in the British Isles, they cause little damage except in very wet areas with mild winters and springs. White mould (*Ramularia vallisumbrosae*) is prevalent in the south-west (particularly in the Scilly Isles) and in Northern Ireland, although the

extensive cultivation of resistant varieties like King Alfred has somewhat reduced incidence. During the period 1925–1944 the worst epidemics in the south-west occurred in 1936 and 1937 [*R.A.M.*, 16, p. 319], when the rainfall for the first five months of the year totalled 17·7 and 23·09 in., respectively. The leaf scorch fungus (*Stagonospora curtisii*) is more widely distributed than *R. vallisumbrosae*, but rarely causes damage outside Wales and south-west England. This disease also is worse in wet seasons, but the general rainfall correlations are less close than with white mould. Epidemics of smoulder (*Botrytis* [*Sclerotinia*] *narcissicola*) and fire (*B.* [*S.*] *polyblastis*) appear to be confined to Ireland and south-west England. Severe attacks of both diseases tend to be local rather than general, and high humidity is probably more important than rainfall.

Virus diseases of Lilies.—*Lily Yearb.*, 14, pp. 93–102, 1950.

This is the report of a discussion opened by Dr. K. Smith at a meeting of the Lily Group of the Royal Horticultural Society on virus diseases commonly affecting lilies [in the British Isles], viz., mottle, which is probably caused by a strain of tulip breaking virus [*R.A.M.*, 28, p. 174], cucumber mosaic [loc. cit.], necrotic fleck (cucumber mosaic+lily symptomless virus) [ibid., 29, p. 563], and an apparently new ring spot disease [ibid., 30, p. 40].

Mr. Raffill stated that he considered *L. henryi* [ibid., 15, p. 507; 20, p. 19] to be a virus carrier as he had infected perfectly healthy seedling lilies direct from what appeared to be a healthy stock, but which was deteriorating slowly and ultimately died out. *L. wallichianum* is a regular carrier of mosaic and so is *L. wallacei*. Dr. Smith stated that his specimens of *L. henryi* mostly show a slight leaf mottle.

Scurti (J.). **Sulla Pseudomonas marginata del Gladiolo.** [Concerning *Pseudomonas marginata* on *Gladiolus*.]—*Ann. Sper. agr.*, N.S., 4, 5, pp. 819–826, 2 pl., 1950. [English summary.]

The author records *Pseudomonas marginata* [*Bacterium marginatum*: *R.A.M.*, 29, p. 563] on gladiolus corms in Italy. The disease was reproduced experimentally by leaf inoculations with pure culture isolates of the bacterium from diseased corms. It is rarely harmful in Italy.

Camellia flower blight survey, December 1949–March 1950.—*Plant Dis. Reptr*, 34, 9, pp. 264–268, 1950. [Multilithed.]

This is a detailed account of the findings of a survey of *Camellia* plantings for the purpose of detecting flower blight (*Sclerotinia camelliae*), conducted by the Division of Domestic Plant Quarantines in co-operation with the Division of Mycology and Disease Survey, Beltsville, Maryland, the results of which have already been noticed [*R.A.M.*, 30, pp. 108, 109].

Beaumont (A.). **Diseases of Dahlias.**—*Gdnrs' Chron.*, Ser. 3, 128, 3338, p. 247, 1950.

Young dahlia cuttings in England are subject to damping-off, often caused by *Phytophthora cryptogea* and *Rhizoctonia* [*Corticium*] *solani* [*R.A.M.*, 15, p. 370], and occasionally by *Botrytis cinerea* [ibid., 17, p. 249; 20, p. 366]. The use of sterilized soil and avoidance of excessive watering will prevent these diseases. Wilt (*Verticillium dahliae* and *Sclerotinia sclerotiorum*) [ibid., 15, p. 370; 16, p. 319; 23, p. 206; 29, p. 289] of fully grown plants occurs occasionally; as a rule, only isolated plants are affected. Only two leaf spots have been recorded in England, *Ascochyta dahliicola* [? *Phyllosticta dahliicola*, fide Grove: ibid., 26, p. 245] and *Entyloma dahliae* [ibid., 12, p. 26; 26, p. 245], both controllable by spraying with a copper

fungicide. Galls are formed by *Bacterium tumefaciens* [ibid., 25, p. 545; 28, p. 159] and *Corynebacterium fascians* [ibid., 18, p. 597; 29, p. 563]; the latter is more common in this country than has been recognized.

STREET (F.). **Some observations and notes on bud blast on Rhododendrons.**—*Rhododendron Yearb.*, 5, pp. 72–77, 1950.

In this paper suggestions are made of possible lines of investigation into *Rhododendron* bud blast [*Pycnostysanus azaleae*: *R.A.M.*, 29, p. 415]. The wide distribution of the fungus in England is considered to be due to the following factors: the unsuitability of woodland conditions to the old hardy hybrids, particularly those with *R. arboreum* parentage; late frosts, especially that of May, 1935, which have made plants more vulnerable; deciduous trees growing in the neighbourhood may harbour the pathogen; and the punctures made by the leaf hopper (*Graphocephala coccinea*) make the plants more vulnerable. The author recommends severe pruning in late April or early May, burning of all removed wood, mulching with peat and cow manure, the removal of all frosted buds and dead flowers, and the application of nicotine powder sprays in July. Woodland trees should be thinned where older hybrids are growing.

KELLER (J. R.). **New virus complex of Chrysanthemums.**—*Bull. N.Y. St. Flower Grs* 62, pp. 2–5, 3 figs., 1950. [Mimeoprinted.]

In cross-graft experiments conducted at Cornell University in January, 1949, numerous small white flecks consistently developed on the new leaves of Vibrant and Sea Gull chrysanthemums affected by stunt [*R.A.M.*, 29, p. 27]. This character has proved extremely valuable as a uniform standard for diagnosis. An apparently distinct disorder was noted in the Mistletoe variety, characterized by numerous white leaf spots usually about $\frac{1}{8}$ in. in diameter. The affected plants were severely dwarfed and produced numerous small axillary shoots. This condition is termed 'measles'. A third disorder, 'crinkle', was recognized in the Blanche variety; severe leaf distortion and dwarfing were accompanied by intense white streaks mostly along the veins, and flecks scattered over the whole leaf surface.

In April, 1950, grafts between healthy Mistletoe and stunted Vibrant, Sea Gull, and Blazing Gold caused typical measles symptoms to appear on Mistletoe. Healthy Mistletoe scions on stunted Blazing Gold developed heavy white leaf spotting, though the Blazing Gold shoots grew alongside with no leaf markings. Grafts between Mistletoe plants with measles and healthy plants of any of the other three varieties caused typical stunt symptoms characteristic of these varieties. It is evident, therefore, that measles in Mistletoe and stunt in the other three varieties are due to the same virus.

Supposedly healthy Blanche stocks or scions caused severe leaf distortion followed by yellow vein blotching to occur in the new growth of healthy Mistletoe. The symptoms were less severe in Vibrant and Sea Gull when these varieties were used in similar combinations with Blanche, but reduced leaf size, vein clearing, and some vein blotching were more characteristic. Blazing Gold also behaved similarly, except that the yellow mottling along the veins was more conspicuous. When stunted scions of any of the other four varieties were grafted to supposedly healthy Blanche, crinkle resulted in Blanche. This symptom also appeared in Blazing Gold; in the other three varieties the symptoms resembled a combination of the two diseases. Crinkled Blanche produced the same additive effect on these varieties when graft combinations were made. The new symptoms were obtained in all grafts involving supposedly healthy Blanche, which was, therefore, harbouring a masked virus, tentatively termed 'chrysanthemum virus Q.' Further evidence indicated that the chrysanthemum stunt and Q viruses are not closely related.

Viennot-Bourgin (G.). **La mort des boutons de Pivoine, Sphaeropsis pæoniae, champignon parasite nouveau pour la France.** [The death of Peony buds, *Sphaeropsis paeoniae*, a parasitic fungus new to France.]—*Rev. Path. vég.*, 29, 1–2, pp. 21–25, 1 fig., 1950.

In the last two years peonies growing near Paris have been attacked by *Sphaeropsis paeoniae* [*R.A.M.*, 14, p. 107], apparently not previously recorded in France. The symptoms on double peonies (*Paeonia officinalis* var. hort.) appear on the young leaves as soon as they are fully open and become more marked during hot weather. As the season advances the number of lesions increases and four to seven may be present on one leaf. They next appear on the petiole in the form of streaks, spreading to the base; the petiole rapidly dries and the leaf blade, whether infected or not, becomes limp and withers. The most harmful effect is on the flower-stalks, which may be attacked after the leaves or independently. A tawny brown to brownish black spot appears a little below the bud, often on a level with a bract. This lesion becomes sunken and rapidly spreads up and down to a distance of 7 to 20 cm., though only partly surrounding the stem. Affected stalks often bend over and the floral bud turns brown and shrivels. The fungus winters in the dead tissues, the spores being liberated from pycnidia in spring; germination is favoured by hot, wet weather.

Control consists in removing and burning the aborted flowers and, in severe cases, the affected leaves. The plants should be sprayed before infection appears, when a few leaves have opened and the first buds develop, with 0·6 per cent. Bordeaux mixture, the copper sulphate being neutralized with an equal weight of lime, or with copper oxide (200 gm. per hl.). A further application should be given during summer, using 1 per cent. Bordeaux mixture or 300 gm. of the oxide.

Ellis (D. E.) & Clayton (C. N.). **Studies on Mycosphaerella rosigena.**—*J. Elisha Mitchell Sci. Soc.*, 66, 1, pp. 35–39, 1 pl., 1950.

This is an amplified report of the authors' studies on the severe outbreak of leaf spot (*Mycosphaerella rosigena*) on greenhouse roses in North Carolina in the autumn of 1947 [*R.A.M.*, 27, p. 523]. The disease has a world wide distribution and at times is of considerable economic importance. The fungus was readily isolated from very small, non-necrotic, purple lesions as well as from large, necrotic spots. The minimum, optimum, and maximum temperatures for the growth of the fungus in culture are given as 5°, 20°, and 35° C., respectively. Infection was obtained by the inoculation of young plants of the Better Times variety, the pathogen being re-isolated from the infected leaves.

Bjelčić (Željka). **Gymnosporangium clavariiforme Jacqu. na Cotoneaster u integerrima Med.** [*Gymnosporangium clavariiforme* Jacqu. on *Cotoneaster integerrima* Med.]—*Annu. Inst. biol. Sarajevo*, 1, 2, p. 61, 1948. [Received October, 1950.]

In August, 1948, the author found on Gola Jahorina mountain (1,780 m.), Yugoslavia, a single *Cotoneaster integerrima* bush, the fruits and leaves of which were affected by *Gymnosporangium clavariiforme* [*R.A.M.*, 28, p. 187], identified by Dr. Petrak. This is the first record of the fungus on this host.

Tompkins (C. M.) & Hansen (H. N.). **Flower blight of Stephanotis floribunda, caused by Botrytis elliptica, and its control.**—*Phytopathology*, 40, 8, pp. 780–781, 1950.

A severe infection of *Stephanotis floribunda* flower buds and open flowers was first observed in raised greenhouse beds in a Californian nursery in July, 1945.

More than 2,000 clusters were spoilt by the numerous irregular, pink to claret-coloured spots, ranging in size from mere flecks to lesions 1 to 5 mm. in diameter, which tended to coalesce and frequently involved half or more of the entire surface of the bud or flower. The blight causes pronounced distortion.

The fungus isolated from diseased material on acidified potato dextrose agar was identified as *Botrytis elliptica* [cf. *R.A.M.*, 28, p. 175; 29, p. 307]. Inoculation experiments with spore suspensions on three potted plants at 13° to 19° C. resulted in typical symptoms of infection after four days on 34 out of 54 buds and open flowers, whereas 19 on a plant atomized with distilled water remained healthy. The pathogen was re-isolated from the infected plants and successfully inoculated into healthy ones. Red and white flowers of *Cyclamen indicum* inoculated with the *S. floribunda* isolate of *B. elliptica* developed roughly elliptical, necrotic lesions, up to several mm. in diameter, and distortion of the petals.

Hirschhorn (Elisa). **Una nueva Tilletiacea para la flora argentina (T. rugispora). Caracteres de su ciclo evolutivo.** [A new Tilletiaceae for the Argentine flora (*T. rugispora*). Features of its life-cycle.]—*Lilloa Rev. Bot., Tucumán*, 21, pp. 25–37, 2 pl., 3 figs., 1949. [English summary.]

Tilletia rugispora is here recorded for the first time on *Paspalum plicatulum* in Argentina, and a detailed account of its life-history and cytology is given, in this paper presented at the Second South American Congress of Botany on 15th October, 1948. The grass is extensively attacked in humid, low-lying areas in the Province of Entre Ríos, and knowledge of the pathogen will be important when more attention can be paid to the forage problem.

Riceman (D. S.). **Mineral deficiency and pasture establishment in the Coonalpyn Downs, South Australia.**—*J. Dep. Agric. S. Aust.*, 54, 3, pp. 132–140, 20 figs., 1 map, 1950.

The author discusses the vegetation types and soil regions of the Coonalpyn Downs (Ninety-Mile Desert) in South Australia, the responses of subterranean clover [*Trifolium subterraneum*], lucerne, oats, and other cereals to the zinc and copper deficiencies there [*R.A.M.*, 29, p. 623], and their improvement by mineral dressings.

Gerdemann (J. W.). **The effect of fertilizer treatment on Sweet Clover root rot.**—*Plant Dis. Reptr*, 34, 9, pp. 261–262, 1950. [Multilithed.]

Root rot of sweet clover [*Melilotus* spp.] caused by *Phytophthora cactorum* [*R.A.M.*, 28, p. 18] is responsible for the loss of many sweet clover stands in Illinois, and in some districts the growing of this forage legume has been discontinued because of the disease. In infested fields the crop may make excellent growth in the year it is sown, but be almost completely destroyed during the winter and following spring.

On a plot near Waterloo, Illinois, where root rot was severe some years ago, and on which no sweet clover had been grown during the preceding five years, Common White, Common Yellow, Erector, Certified Evergreen, and Madrid varieties made excellent growth the year they were seeded, especially where phosphate, potassium, and magnesium were applied [ibid., 28, p. 67]. However, in the following spring root rot was severe in all, although Common Yellow appeared to be less severely damaged than the other varieties. The fewest surviving plants in each variety were in the plots where growth had been best the previous year.

The disease occurs in almost every field in the area, regardless of the fertility level of the soil. It is suggested that breeding of resistant varieties would be the most promising means of control.

Traversi (Blanca A.). **Estudio inicial sobre una enfermedad del Girasol ('Helianthus annuus' L.) en Argentina.** [Preliminary study on a disease of the Sunflower (*Helianthus annuus* L.) in Argentina.]—*Rev. Invest. agríc., B. Aires*, 3, 4, pp. 345–351, 7 pl. (3 col.), 1949.

The virus responsible for the destructive and widespread disease of sunflowers recently reported from Argentina [*R.A.M.*, 29, p. 366] withstood exposure to a temperature of 98° to 99° C. Its dilution end point could not be definitely determined, but the juice was still virulent at 1 in 100,000. Plants infected either naturally or artificially and maintained at temperatures above 26° to 28° rapidly developed lethal symptoms. At 18° to 24° the progress of the disease was slower, and at lower temperatures its appearance was sometimes delayed until the advent of warmer and more humid conditions, which likewise accelerated the course of infection in plants already attacked.

The constancy of the spontaneous appearance of the disease, both in the greenhouse and in field plantings, and its gradual increase since 1942, when it was presumably introduced into the country on Russian seed, suggested the transmissibility of the virus through the seed. In greenhouse experiments in sterilized soil with 500 seeds each of the varieties Klein Gigante, Saratov, Skorospelki, and Kruglik, widely cultivated in the heavily infected region of Pergamino, the percentages of transmission were 43·33, 17, 21·34, and 22·05, respectively. The virus is also readily communicable from diseased to healthy plants by mechanical juice inoculation and through the agency of *Thrips tabaci*, *Myzus persicae*, and *Trialeurodes vaporariorum*. Among many other species of plants contracting infection by the sunflower virus in mechanical inoculation tests were maize, onion, leek, *Hippeastrum*, *Narcissus*, hyacinth, hemp, spinach, beet, *Delphinium*, peony, cabbage, turnip, bean (*Phaseolus vulgaris*), broad bean, pea, cowpea, lucerne, clover, *Tropaeolum majus*, cotton, carrot, parsley, celery, tobacco and other *Nicotiana* spp., tomato, chilli, potato, eggplant, and other *Solanum* spp., *Datura* spp., *Petunia hybrida*, *Hyoscyamus niger*, *Atropa belladonna*, *Digitalis purpurea*, vegetable marrow, chicory, endive, lettuce, *Zinnia elegans*, *Calendula officinalis*, *Dahlia variabilis*, and *Leonorus sibiricus*, the last-named serving as an indicator since it is immune from infection by any of the other viruses hitherto investigated.

The losses caused by the sunflower virus are described as 'enormous', and its transmissibility through the seed is of great assistance in its wide diffusion through the country.

Armstrong (Joanne K.) & Armstrong (G. M.). **The Fusarium wilt of Crotalaria.** —Abs. in *Phytopathology*, 40, 8, p. 785, 1950.

Monospore cultures of a *Fusarium* causing *Crotalaria* wilt were obtained from Louisiana, Mississippi, Florida, and India, and inoculated into seven species of *Crotalaria* in the greenhouse. On the basis of selective pathogenicity three physiologic races of the fungus were differentiated, namely, (1) from India, (2) from the Louisiana–Mississippi area, and (3) from Florida. Isolates of *Fusarium* from cotton, okra [*Hibiscus esculentus*], tomato, and cowpea induced no external symptoms of wilt on one or more species of *Crotalaria*. One *Crotalaria* isolate, however, caused appreciable internal discoloration in cowpeas, while other strains from the former host caused similar but even stronger effects in *Cassia tora*. The Louisiana–Mississippi isolates did not cause more than 11·5 per cent. external wilt of the Yelredo soy-bean variety, while the LZ variety contracted only 14·3 per cent. infection from the Florida strain. Inoculation with one or more *Crotalaria* wilt isolates did not result in wilting of sesame, sweet potato, tobacco, or pigeon pea plants. Notwithstanding considerable morphological and cultural differences, the American *Fusarium* isolates fall within the range of *F. udum* var. *crotalariae* [*R.A.M.*, 26, p. 265], to which they are accordingly assigned.

Thorne (D. W.) & Wann (F. B.). **Nutrient deficiencies in Utah orchards.**—*Bull. Utah agric. Exp. Sta.* 338, 29 pp., 7 figs. (2 col.), 3 maps, 1950.

Nutritional disorders caused by deficiencies of nitrogen, iron, manganese, and zinc [*R.A.M.*, 27, p. 424] are extensive in fruit trees in Utah. Nitrogen deficiency is most acute on sandy and gravelly soils.

Iron chlorosis occurs on soils high in lime, usually loam to clay in texture, and is encouraged by high soil moisture. It was found in 23 per cent. of the Utah orchards. In mature fruit trees it is best controlled by injecting iron salts in the early spring. For small trees, bushes, and ornamentals iron sulphate may be added to the root zone in bands or pockets immediately before irrigation. Control of soil moisture relations is widely effective in controlling the disorder.

Manganese deficiency is found on nearly every type of soil in about 18 per cent. of the orchards distributed over most parts of the State. An unusually large number of trees in the Fruita area of Wayne county were affected, but there were only traces in the Moab area of Grand county. It is remedied most effectively by drilling manganese sulphate into the soil at 200 to 400 lb. per acre.

Zinc deficiency occurs on sandy or gravelly soils low in lime. Soluble phosphorus is commonly high in zinc-deficient soils. The symptoms were observed in about 6 per cent. of the orchards, the most severely affected areas being in Box Elder and Davis counties. The deficiency is usually cured by dormant sprays with zinc sulphate solution (15 to 30 lb. per 100 gals.) [ibid., 27, p. 511]. Control of organic matter and the judicious use of phosphate fertilizers are also recommended for prevention.

Jørstad (I.). **Rustsopper på frukttræer og bærvekster.** [Rust fungi on fruit trees and soft fruits.]—*Frukt og Bær*, 3, pp. 20–30, 8 figs., 1950.

The available information on the symptomatology and life-histories of the following 11 rusts attacking fruit trees in Norway is summarized: *Gymnosporangium tremelloides* on apple [*R.A.M.*, 17, p. 535], *G. clavariiforme* on pear [ibid., 17, p. 536], *Pucciniastrum areolatum* on bird cherry (*Prunus* [*padus*]) and other *Prunus* spp. [ibid., 26, p. 206], *Tranzschelia* [*Puccinia*] *pruni-spinosae* on damson, *Cronartium ribicola* on currant [ibid., 24, p. 456], *Melampsora* [*larici-*] *epitea* [ibid., 16, p. 491; 19, p. 240; 22, p. 408] and *M. ribesii-viminalis* [ibid., 11, p. 412] on currant and occasionally on gooseberry; *P. caricina* [*P. pringsheimiana*] on gooseberry [ibid., 16, p. 476; 20, p. 72]; *P. ribis* on currant [ibid., 24, p. 456; 26, p. 551]; *Phragmidium rubi-idaei* on raspberry [ibid., 28, p. 528]; and *P. violaceum* [ibid., 21, p. 266] on bearberry (*Arbutus* [*Arctostaphylos*] *uva-ursi*).

Ramsfjell (T.). **Mangan og manganmangel.** [Manganese and manganese deficiency.]—Reprinted from *Gartneryrket, 1950*, 5, 4 pp., 3 figs., 1950.

The symptoms of manganese deficiency on raspberry [*R.A.M.*, 29, p. 55] and apple [ibid., 27, p. 74] are described from Norway, where the disorder also affects strawberry [ibid., 27, p. 337], plum, rose, *Chrysanthemum*, and *Hydrangea opuloides* [*H. macrophylla*].

Berducou (Jeanne). **Différence de sensibilité de Nectria galligena et de Nectria cinnabarina à l'action de l'acide indol-β-acétique.** [Difference in sensitivity of *Nectria galligena* and *Nectria cinnabarina* to the action of β-indole acetic acid.] —*C. R. Acad. Sci., Paris*, 231, 5, pp. 367–369, 1 graph, 1950.

Nectria cinnabarina reacted very weakly to β-indole acetic acid [*R.A.M.*, 28, p. 526], a dosage of 2 mg. being required to accelerate its growth in pure culture. On the other hand, *N. galligena* [ibid., 29, p. 32] proved highly sensitive, reacting by speedier development to a dosage of 0·02 mg.

Prentice (I. W.). **Experiments on rubbery wood disease of Apple trees. A progress report.**—*Rep. E. Malling Res. Sta., 1949*, pp. 122–125, 1 pl., 1 diag., 1950.

In experiments started at East Malling Research Station, Kent, in 1945, 16 maiden Lord Lambourne apple trees on Malling IX rootstocks were tested for the presence of 'rubbery wood' [*R.A.M.*, 30, p. 45 and next abstract] by bending the stems between the fingers, by measuring stem deflection caused by a 500 gm. weight acting at 20 cm., and by staining sections of the stem. Eight of these maidens, classified as normal or only slightly rubbery, were selected for side-grafting in April, 1945, with scions from definitely rubbery Lord Lambourne trees. The other trees remained ungrafted and served as controls. In 1947 several of the grafted trees appeared slightly rubbery. In 1948 all the controls were normal by hand bending and all the grafted trees markedly rubbery except one, which appeared to be normal; by histological examination incomplete lignification was very conspicuous in two of the control trees and seven of the grafted ones. According to both methods rubbery wood was more prevalent in the grafted trees. It is suggested that the condition should be treated as a virus disease for the present; growers should select bud and graft wood only from trees showing no sign of the disease. It would seem that rubbery wood can be diagnosed by hand test with fair accuracy, and it should be possible to eliminate a high proportion of affected maiden trees in the nursery.

Luckwill (L. C.). **Some virus diseases of fruit trees in England.**—*Fruit Yearb.*, 4, pp. 84–88, 3 pl., 1950.

After discussing the general question of the recognition of virus diseases of fruit trees [*R.A.M.*, 30, p. 45 and preceding and next abstracts], the author gives brief notes on apple mosaic, rubbery wood, false sting [ibid., 24, p. 23; 25, p. 304], flat limb [ibid., 29, p. 248], of which a mild form only is found in England and it has not yet been proved transmissible, and chat fruit; pear stony pit [ibid., 24, p. 23; 29, p. 513]; plum stunt and mosaic [cf. ibid., 19, p. 416; 22, p. 10]; and cherry tatter leaf and rasp leaf [ibid., 27, p. 355]. Apple rubbery wood has also been seen on James Grieve, Miller's Seedling, Dartmouth Crab, Sturmer Pippin, and Kingston Black; most other varieties appear tolerant. Plum stunt is a recently recognized disease fairly common on Giant Prune, Bountiful, Evesham Wonder, and Victoria. Affected trees are stunted and have a weeping habit and tend to flower and fruit before healthy trees. The branches are weak and brittle and have a relatively small woody cylinder and thick, spongy bark, while the internodes are short and the nodes swollen and prominent. When transmitted by budding to peach seedlings the disease produces characteristic 'shock' symptoms. The plum mosaic symptoms seen in England appear to be identical with those observed in South Africa [cf. ibid., 28, p. 338], the leaf symptoms resembling those of apple mosaic.

The paper concludes with a note on the control of virus diseases in fruit trees by the propagation of virus-free material, eradication of sources of infection, and the suppression of insect vectors.

Ramsfjell (T.). **Virussjukdommer på Eple.** [Virus diseases of Apple.]—Reprinted from *Gartneryrket, 1950*, 20, 7 pp., 4 figs., 1950.

The following virus diseases affecting apples [see preceding abstracts] in Norway are described in popular terms: mosaic, which is widespread but of little importance; rubbery wood, probably affecting all nursery material of the Lord Lambourne variety in the country, flat limb occurring mostly on Gravenstein but occasionally observed also on James Grieve, Filippa, and Signe Tillisch; and false sting on Fuhr and Gravenstein.

Moore (M. H.). **Brown rot of Apples : fungicide trials, and studies of the relative importance of different wound-agents.**—*J. hort. Sci.*, 25, 4, pp. 225–234, 1 pl., 1950.

In tests carried out at East Malling in 1945–6 on Cox's Orange apple trees, new organic fungicides (a dispersion in methyl cellulose of commercially pure ferbam at 0·2 per cent., 0·1 per cent. commercial thiram as a wettable powder, and 0·005 per cent. commercial phenyl mercury chloride on china clay as a wettable powder [cf. *R.A.M.*, 27, p. 371]) when applied as protective sprays showed no promise of controlling brown rot (*Sclerotinia fructigena*) [ibid., 29, p. 313]. It appears that codling moth (*Cydia pomonella*) and scab (*Venturia inaequalis*) are the chief wound-forming agents; apple sawfly (*Hoplocampa testudinea*) is not of material importance. The percentage rotting following the omission of the specific spray against each of these three organisms was 21·2, 19·5, and 7·3, respectively, compared with 9·1 for those receiving the complete spray. Avoidable losses, due mainly to primary rotting largely preventable by spray treatments designed to eliminate the wound-agents, may amount to two or three times as much as unavoidable losses. Though direct spray treatment may fail to control the disease, indirect spray treatment and strict observance of plant hygiene are sound practice for brown rot control.

Hutton (K. E.). **Black spot of Apple and Pear.**—*Agric. Gaz. N.S.W.*, 61, 7, pp. 345–349, 4 figs., 1950.

Black spot or scab (*Venturia inaequalis* and *V. pirina*) [*R.A.M.*, 22, p. 91; 29, p. 625] caused heavy losses in all apple and pear growing districts in New South Wales in 1950, except in the Murrumbidgee Irrigation Area. Those districts in which the disease is usually of minor importance suffered somewhat more severely than areas in which scab is a serious problem every year, mainly because the growers in the latter districts have more experience in control. The spray programme recommended for apples is a routine spray at the green-tip stage with Bordeaux mixture (15–15–100 plus $\frac{1}{2}$ white or pale oil) or 1–20 lime-sulphur, followed in districts where scab is severe by Bordeaux mixture at spur-burst, regular applications with 1–40 lime-sulphur at the pinking stage, and 1–80 to 1–100 lime-sulphur at the calyx stage or preferably earlier at late petal-fall, with subsequent cover sprays (1–80 to 1–120 lime-sulphur) at intervals of three weeks until the beginning of December. The programme for pears is similar, but for the calyx spray colloidal sulphur (2 lb. per 100 gals.) or wettable sulphur (3 to 5 lb. per 100 gals.) should be used.

Poulos (P. L.) & Heuberger (J. W.). **A promising fungicide-plant food combination for Apple scab control.**—*Plant Dis. Reptr*, 34, 8, p. 239, 1950. [Multilithed.]

In a compound evaluation test for the control of apple scab [*Venturia inaequalis*: *R.A.M.*, 29, p. 84] on Rome apples carried out at West Dover, Delaware, magnetic 70 paste type sulphur at 8 lb. per 100 gals. for the first three applications and the same at 4 lb. plus nugreen (a urea compound) at 5 lb. per 100 gals., for the next three applications controlled the disease effectively (0·7 per cent. foliage scab compared with 8·5 per cent. for sulphur paste alone and 45 per cent. for the untreated).

Allen (F. W.) & Torpen (E.). **Gravenstein Apple storage tests.**—*Bull. Calif. agric. Exp. Sta.* 716, 23 pp., 14 graphs, 1950.

In investigations carried out at the University of California 200 boxes of Gravenstein apples from Sonoma county were stored immediately at 32° F. for periods up to 120 days. Bitter pit [*R.A.M.*, 26, p. 454] developed after a few weeks

(average 4·9 per cent. after six weeks and 10·6 per cent. after 60 days) and was less for later pickings. Scald [ibid., 25, p. 507; 29, p. 263], also less in later pickings, developed after 90 days, deterioration in flavour after 2½ to 3 months, and over-ripeness and breakdown of the flesh after 100 to 120 days [ibid., 26, p. 229; 28, p. 377]. In general, these troubles appeared to be correlated with the particular orchard from which the fruit came. Apples from two or three of the orchards developing the highest percentage of bitter pit also showed the most scald and breakdown. Three orchards with little bitter pit were also low in other troubles. The most desirable fruit for storage was fruit harvested at mid-season, followed by that harvested late and stored at once. Large fruit developed more bitter pit and breakdown than smaller fruit and had inferior storage qualities. Highly coloured apples were less susceptible to scald than green ones. Breakdown was associated with delay in cooling and late picking. It is concluded that Gravenstein apples destined to be sold in the fresh market in California should not be stored more than two or three months, while if destined for the eastern market they should not be kept longer than two months.

Preliminary results from laboratory storage tests in artificial atmospheres (5 per cent. carbon dioxide and 2½ per cent. oxygen) [ibid., 29, p. 33] indicated that storage life may be increased by 50 per cent. or more by this method.

Marcellin (P.) & Poignant (P.). **Les maladies physiologiques des Pommes et des Poires de conservation.** [Physiological disorders in stored Apples and Pears.]—*Phytoma*, 3, 15, pp. 9–15; 16, pp. 17–24, 8 figs., 1950.

After briefly discussing the problem of physiological disorders of orchard fruits in general, the authors survey the bibliographic field on the subject of varietal susceptibility of apples and pears to superficial scald and lenticel spotting [*R.A.M.*, 29, pp. 263, 314, 515] and in particular to the toxicity of volatile emanations as the fruit matures, the determining factors being climate, variety, physiological condition of the fruit, ventilation, and humidity. Some practical recommendations from these observations are given. The effect of growth substances on scald is also discussed. The classification of storage disorders and the various names applied to them are dealt with in an appendix.

In part II the symptoms, varietal susceptibility and control of the various forms of cork [ibid., 29, p. 468] and bitter pit [ibid., 26, p. 454] are described, together with conditions favouring the development of the latter. The histology of bitter pit is described in Appendix II and notes on soft scald and internal decomposition are given in Appendix III.

Carne (W. M.). **Brown heart of Apples and its relation to our knowledge of Apples and of ship carriage of perishable foods.**—*J. Aust. Inst. agric. Sci.*, 16, 2, pp. 59–64, 1950.

The author reviews the history of investigations into the physiological disorder brown heart in Tasmanian apples [*R.A.M.*, 29, p. 314]. The advances made in refrigeration and ventilation for apple storage in ships are described. Since 1945 experience has shown that within limited seasons selected varieties of apples and oranges can be carried for about one month without refrigeration with reasonable success provided they receive ample ventilation and are not in the tropics for much more than two weeks. A modification of the vertical air-cooling system used in refrigerated ships, in which atmospheric air is blown by fans through the stow from below and out through ventilators or hatches, is being installed in an increasing number of ships. The fans are operated when the hold air is above shade temperature on deck, thus preventing a build-up of both temperature and carbon dioxide.

Brough (C. R.). **Potash deficiency in Apple trees.**—*J. Dep. Agric. Vict.*, 48, 10, pp. 456–457, 2 figs., 1950.

Potassium deficiency [*R.A.M.*, 27, p. 370] may affect apple trees in all the apple-growing districts of Victoria, but is most severe in the south and in areas with heavy rainfall. During the last two seasons, because of continuous and heavy rains, leaf scorch appeared in December in orchards which are usually free from the disorder. Where severe leaf scorch occurs it is recommended that soil dressings of potassium sulphate be applied at the rate of 2 lb. per tree, or potassium salts added each spring to the normal fertilizers. The treatment may have to be repeated for several years before the trouble disappears. Where scorching is less severe a complete fertilizer at 5 lb. per tree is adequate. Even where no deficiency symptoms are apparent an annual potassium dressing is advised.

Ramsfjell (T.). **Sprøyteskade.** [Spray injury.]—Reprinted from *Frukt og Bær, 1949*, 8 pp., 10 figs., 1949.

A brief note on the symptoms of spray injury in Norwegian orchards, with special reference to apple trees, is followed by a discussion, based on 11 contributions to the literature, of the causes of the damage.

Bremer (H.) & Göksel (N.). **Armutlarda memeli pas mücadelesi.** [How to control Pear rust.]—*Mahsul Hekimi* (*Plant Prot. J.*), 3, 9, pp. 209–212, 1950. [English summary.]

For the control of pear rust (*Gymnosporangium sabinae*) in Turkey [*R.A.M.*, 27, p. 115] spraying is advised with 1 per cent. Bordeaux mixture or equivalent commercial copper preparations from bud burst for approximately one month. The eradication of the alternate host *Juniperus* [*sibirica*] is impracticable and protective measures difficult to apply. Moreover, severe infections of pear trees remote from junipers were observed.

Turček (F. J.). **Rozširuje, alebo ničí strakapúd moniliozu?** [Does the pied woodpecker distribute or destroy moniliasis?]—*Ochr. Rost.*, 23, 2, pp. 159–165, 5 figs., 1950. [English summary.]

Fruit gardens at Banska Štiavnice, Slovakia, and in the vicinity, are heavily infested with *Sclerotinia fructigena* and *S. cinerea* [*S. laxa*: *R.A.M.*, 12, p. 640], and growers pay little or no attention to it, mummified apple and plum fruits being left on the trees. Evidence was obtained that the pied woodpecker (*Dryobates maior pinetorum*) fed on mummified plums and transported them from one garden to another.

McLarty (H. R.) & Woodbridge (C. G.). **Boron in relation to the culture of the Peach tree.**—*Sci. Agric.*, 30, 9, pp. 392–395, 4 pl., 1 graph, 1950.

This information has already been noticed from another source [*R.A.M.*, 29, p. 265].

Zeller (S. M.) & Milbrath (J. A.). **The recovery of western X-disease of Peach from Montmorency Cherry and its relation to buckskin of sweet Cherry.**—*Phytopathology*, 40, 8, pp. 707–711, 2 figs., 1950.

This is an amplified account of the authors' studies in Oregon on the identity of the causal virus of western X-disease [? a strain of peach X-virus] of peach, red-leafed chokecherry [*Prunus demissa*] disease, and buckskin or 'little cherry' disease of sweet and sour cherry [see next abstract], a preliminary note on which has already appeared [*R.A.M.*, 28, p. 222; 29, p. 312].

Lott (T. B.). **Some further observations on small bitter Cherry.**—*Sci. Agric.*, 30, 10, pp. 444–446, 1 pl., 1950.

Small bitter cherry [*R.A.M.*, 27, p. 28; 29, p. 349] is becoming increasingly important in the southern part of the Okanagan Valley, British Columbia. By 1949, 22 infected trees had been recorded in 14 orchards. A single Bing cherry tree graft-inoculated with infected scions in 1941 [ibid., 27, p. 28] demonstrated transmission of the disease in 1949 when the fruits on small branches from below the points of inoculation were affected. The rate of spread has differed widely in different trees and sometimes in different years in a single tree.

In limited experiments no relationship was demonstrated between small bitter cherry and peach western X-disease [? strain of X-virus: ibid., 29, p. 349, and preceding abstract], or other sweet cherry diseases causing abnormal fruits.

Wenzl (H.). **Weitere Untersuchungen über die Sternfleckenkrankheit der Marille (Prunus armeniaca).** [Further studies on the star spot disease of the Apricot (*Prunus armeniaca*).]—*PflSch. Ber., Wien*, 4, 11–12, pp. 180–186, 1 diag., 1950. [English summary.]

Further observations on the 'star spot' disease of apricots and cherry plums (*Prunus cerasifera*) in Austria [*R.A.M.*, 18, p. 323] again revealed its association with drastic pruning. The agency of a virus would appear to be excluded by the disappearance and recurrence of the symptoms in a manner reminiscent of Hildebrand's non-virus-induced 'asteroid spot' of *P. cerasifera* in the United States [ibid., 24, p. 235], with which the Austrian disease is probably identical.

Wenzl (H.). **Untersuchungen über die Absterbeerscheinungen an Marille (Prunus armeniaca).** [Studies on necrosis symptoms in Apricot (*Prunus armeniaca*).]—*PflSch. Ber., Wien*, 4, 11–12, pp. 187–200, 1 diag., 1 graph, 1950. [English summary.]

Investigations covering a three-year period on over 1,300 apricot trees in a large Viennese orchard yielded no evidence of any connexion between the incidence of infection by *Monilinia* [*Sclerotinia*] *laxa*, judged by the number of mummified fruits [*R.A.M.*, 28, p. 178], and the occurrence of apoplectic die-back in the two succeeding years, nor between necrosis of the branches and the location of their point of origin. On the other hand, the production of an increased number of shoots from the rootstock (*Prunus cerasifera*) presaged dying-off during the next year.

No association was observed between trunk or branch wounds and apoplectic necrosis, but such injuries tend to enhance the symptoms of gradual dying-off signalized by shrivelling of the shoot tips. Inoculation experiments with spore suspensions of *Cytospora* [*Valsa*] *cincta* from apricot [ibid., 26, pp. 186, 533; cf. 30, p. 18] on healthy shoots were uniformly unsuccessful in the production of necrosis, but they frequently resulted in an increase of gum formation in the infected wounds. The infection of wounds on necrotic branches of apoplectic trees promoted a rapid extension of the fungus originating therein.

Four types of apricot necrosis occur in Austria, namely, (1) the apoplectic dying-off of the entire tree, or of one or more large branches, at the base of which the passage of sap is checked; (2) a gradual decline of the tree, accompanied by weakness of the shoots and extensive desiccation of their tips, mostly resulting from injuries; (3) shoot tip necrosis due to blossom infection or more often fruit infection by *S. laxa*; and (4) occasional dying-off of single branches above canker-like wounds, below which adventitious twigs are produced.

Karel (G.). **Malatya Kayısılarında Monilia hastalığı.** [*Monilia* disease on Apricot trees in Malatya.]—*Mahsul Hekimi* (*Plant Prot. J.*), 2, 8–9, pp. 179–182, 1949. [English summary.]

Monilia disease [*Sclerotinia fructigena* and *S. laxa*: *R.A.M.*, 26, p. 533; 29, pp.

104, 313] causes great damage to all *Prunus* spp. in Turkey, especially apricot. Since the fruit trees in the gardens of a large area, including Malatya, Ismet pasa, Gündüzbey, and Tecde, are very close together *Cladosporium* [*Fusicladium*] *carpophilum* [see next abstract] is also of some importance in causing deterioration of fruit quality.

Novák (J. B.). **Strupovitost a dírkovitost Meruněk. (Příspěvek k strupovitosti peckového ovoce I.)** [Scab and shot hole of Apricots. (Contribution to scab diseases of stone fruits I.)]—*Ochr. Rost.*, 23, 2, pp. 127–136, 4 pl., 1950. [Russian and English summaries.]

In July, 1949, at Tišnov, Czechoslovakia, the author observed many diseased apricot fruits. Lightly infected fruits had small, round, olive green to black spots with pale centres, which in severe cases coalesced, forming superficial corky and scabby areas. On some trees the majority of the fruit was thus affected. A small amount of fruit had larger, sunken, dark lesions. Both types were accompanied by shot hole effects on the leaves. The first disease, which is apparently widespread in Moravia and probably also occurs in Bohemia and Slovakia, is caused by a species of *Cladosporium*, presumably *C.* [*Fusicladium*] *carpophilum* [*R.A.M.*, 18, p. 535], and the second by *Clasterosporium carpophilum* [ibid., 28, p. 405; C.M.I. map No. 188]. The former fungus, not previously reported in Czechoslovakia, was also found on plums, and peach scab, previously attributed to *Fusicladium* [*Venturia*] *cerasi* (Blattný [C.] & Starý [B.]. Atlas škodlivých činitelů našich ovocných plodin. [Atlas of agents injurious to our fruits.] Prague, 1944.), is probably due to the same fungus.

The author compares and contrasts the symptoms and morphology of *F. carpophilum* and *Clasterosporium carpophilum* and reviews the taxonomy of both fungi.

Clarke (W. S.). **Selected Mazzard Cherry seedlings leaf spot free.**—*Rep. Pa agric. Exp. Sta., 1948–9* (*Bull.* 515), *Suppl.* 3, pp. 6, 8, 2 figs., 1950.

After discussing the response of mazzard and mahaleb cherry root stocks to leaf spot (*Coccomyces hiemalis*) [*R.A.M.*, 20, p. 69 and next abstract], the author states that the source of the stocks is very important. Mahaleb stocks from trees established in the United States have often proved excellent, while mazzard stocks grown from seeds of Pennsylvania trees often produced superior trees to those from seed from elsewhere. Mazzard trees from seed collected on Mount Nittany (1,800 ft.) and from near Lemont have grown for 25 years consistently free from any serious leaf spot attack [cf. ibid., 27, p. 175].

Lewis (F. H.). **Interests of growers and processors differ in choice of Cherry sprays.**—*Rep. Pa agric. Exp. Sta., 1948–9* (*Bull.* 515), *Suppl.* 3, pp. 5, 10, 1 fig., 1950.

It is stated that loss of leaves from cherry trees before harvest due to leaf spot [*Coccomyces hiemalis*: see preceding abstract] reduces the solids content of the fruit. Leaves were lost in June, 1945, from unsprayed trees [*R.A.M.*, 28, p. 219] the fruit of which had 2·8 and 5 per cent. lower solids than trees sprayed with compound 341 and Tennessee 26, respectively. Where defoliation occurs after harvest unsprayed trees may be higher in solids. Phygon and C341 have caused little fruit dwarfing, although combined with lead arsenate and lime they may cause slight reduction. Fermate and the isothans have a slight to moderate tendency to dwarf fruit. The effect is evident where rainfall is inadequate in late June and July. The proprietary or insoluble coppers, lime sulphur, zinc and copper chromate compounds, and perhaps zerlate and dithane plus zinc-lime cause moderate dwarfing averaging about 8 to 10 per cent. Bordo causes too much dwarfing although

solid content of such fruits is highest, while it is lower with the proprietary coppers; the organics do not dwarf the fruit.

Sharvelle (E. G.) & Teller (M. N.). **Control of brown rot.**—*Phytopathology*, 40, 8, pp. 778–780, 1950.

Ten days before harvest in 1945, cherry-plum hybrids of the Sapa variety in a commercial orchard in Minnesota were sprayed with dritomic wettable sulphur, 4 lb. in 100 gals.; the same at 3 lb. plus Tennessee Copper 34 at 1 lb.; and two lots of fermate [*R.A.M.*, 27, p. 510] (experimental and commercial), also at 1 lb. in 100 gals. Isolated plantings of the hybrid in the vicinity of the orchard served as controls and developed 80 per cent. infection of brown rot (*Sclerotinia* spp.) [*S. fructicola* and *S. laxa*] as compared with 4·1, 1·1, 1·7, and 1·8 per cent., respectively, for the fungicide-treated ones. The examination of lots of the apparently healthy sprayed fruits during the first fortnight of storage revealed rapid deterioration among those treated with wettable sulphur alone (25·7 per cent. in the first week and 61·4 per cent. before the end of the second); the admixture of Tennessee Copper 34 reduced the loss from brown rot at the end of a fortnight to 21 per cent. The percentages of infection after a fortnight in the lots treated with commercial and experimental fermate were 39·6 and 16·7, respectively.

In another test 200 apparently sound fruits were placed on brown paper in each of six wooden greenhouse flats at 25° C. Lots 1 and 2 were dusted with experimental copper dusts A and B, respectively; lot 3 with apple dritomic sulphur; lot 4 with chloramine B; lot 5 with fermate; and lot 6 was left untreated. At the first inspection, 48 hours after dusting, none of the fruits treated with chloramine B was infected, but 3 to 9 per cent. of those dusted with the other preparations were rotted. The amount of decay in the controls was 24 per cent. At the final count ten days later, 50 per cent. of the chloramine-treated fruits and 77 to 78·5 per cent. of those dusted with the other chemicals were discarded on account of brown rot, the incidence of which in the untreated was 72 per cent.

It is evident from these data that the samples which looked healthy when selected and stored must already have been infected in the field before treatment. Even the most promising of the fungicides, chloramine B, lost its efficacy after the first few days of storage and cannot be recommended as a means of combating storage rot. At the moment, therefore, brown rot of Sapa cherry-plums is controllable only in the orchard.

Starý (B.). **Odumírání Angreštů na Třebenicku.** [Gooseberry die-back in the Třebenice district.]—*Ochr. Rost.*, 23, 1, p. 70, 1950.

Gooseberry bushes in the Třebenice district, Czechoslovakia, have recently suffered from die-back caused by *Botrytis cinerea* [*R.A.M.*, 22, p. 73]. Plants heavily fertilized with potassium and nitrogen (a common practice to obtain high yields) are most severely attacked. No damage is reported from unfertilized plots.

Sharvelle (E. G.) & Teller (M. N.). **The value of copper fungicides for the control of Strawberry leaf spot.**—*Phytopathology*, 40, 8, pp. 777–778, 1950.

Yellow cuprocide (3 lb. per 100 gals.) was the most effective of the fungicides tested at the Minnesota Agricultural Experiment Station in 1944 for the control of strawberry leaf spot (*Mycosphaerella fragariae*) [*R.A.M.*, 28, p. 225] on the Senator Dunlap variety, two applications, on 9th and 21st June, reducing the incidence of infection from 65·2 to 24·4 per cent. It was, however, very injurious to the foliage, 58·4 per cent. of the leaves being damaged. Microgel, Bordeaux mixture, and Tennessee Copper 34 were less efficient than cuprocide, and none of the preparations can be recommended as a substitute for tribasic copper sulphate.

Trébuchet (G.). **La sélection sanitaire du Fraisier.** [Health selection of the Strawberry.]—*Bull. Soc. nat. Hort. Fr.*, Sér. 7, 4, 5, pp. 119–126; 6, pp. 141–148, 5 figs., 1 diag., 1950.

This is a review of degeneration in strawberries in France, due to yellow edge and crinkle viruses [*R.A.M.*, 29, p. 160]. The large-fruited strawberry varieties grown in France originate from *Fragaria chiloensis* and *F. virginiana*, of which the former never shows symptoms of yellow edge (though it may be a carrier), while the latter rapidly develops them. *F. californica* and *F. vesca* and its varieties are also susceptible, the latter being used as an indicator.

The isolated block method of cultivation [loc. cit.] is described and details are given of the English certification scheme [ibid., 28, p. 341]. The paper concludes with a note on red core (*Phytophthora fragariae*) [ibid., 29, p. 468], known as apoplexy in France, where it has been reported from Plougastel, the Charentes, and the vicinity of Paris.

Sarasola (A. A.). **Alternaria tenuis como agente etiológico de una nueva enfermedad del Olivo.** [*Alternaria tenuis* as the etiological agent of a new disease of the Olive.]—*Lilloa Rev. Bot., Tucumán*, 21, pp. 7–24, 2 pl., 1 fig., 1949. [English summary.]

In this paper, presented at the Second South American Congress of Botany on 15th October, 1948, the author reports that a fungus belonging to the *Alternaria tenuis* group, which was isolated from material from olive trees [*R.A.M.*, 7, p. 187] suffering from a hitherto undescribed disease, involving the twigs throughout the region of cultivation in Argentina and affecting the leaves and fruits also in the Province of Buenos Aires. The twigs wilt and gradually die, or shed their leaves and remain defoliated. Blister-like swellings develop on the larger branches and stems. The leaves die from the tips downwards and sometimes bear ashen spots, 2 to 3 mm. in diameter. The fruits are pitted and sometimes split at the base, which is paler than the rest of the epicarp; in cases of severe infection they are inedible. Damage to the fruits is more extensive in the large-fruited varieties, e.g., Della Madonna, San Agostino, Ascolano, and Araucana, while the twigs of Ascolano, Frantoio, and Leccino are particularly susceptible. Inoculation experiments with the fungus isolated from the several organs resulted in cross-infections on the fruits, leaves, and twigs. Soil treatments and branch injections with sodium borate and boric acid invigorated nursery plants and slightly reduced the mortality of twigs and foliage. Both these chemicals and also copper sulphate increased yields but did not prevent malformation of the fruits.

In two colonies on potato dextrose agar the conidia measured 15·3 to 81·6 by 10·2 to 16·4 and 22·9 to 62·4 by 10·2 to 17·8 μ, thus falling within the *A. tenuis* group as interpreted by Neergaard [ibid., 25, p. 579].

Das Gupta (S. N.), Verma (G. S.), Agarwal (S. C.), Rai (J. N.), & Iyer (S. N.). **Necrosis of the Mango fruit.**—*Curr. Sci.*, 19, 5, p. 153, 1950.

Necrosis [or black tip] has been induced in healthy Dasehri and Safeda mango fruits [*R.A.M.*, 26, p. 114] at the Department of Botany, Lucknow University, by the injection of sterile mango juice exposed for some time to contact with brick kiln fumes. Positive results were obtained only on fruits sized $1\frac{1}{4}$ to $3\frac{1}{2}$ in., up to 50 per cent. of which contracted the disorder. Of the many solvents tested, besides mango juice, ether and chloroform (especially the former) readily absorbed the necrosis-inducing constituent of the fumes, and half the fruits injected with the ether-soluble portion developed the symptom. Of the three fractions separated from the ether-soluble components of the fumes, one crystallizing in hexagonal form proved to be capable of causing necrosis.

[A detailed account of this work is given in the Progress Report Mango necrosis scheme, Lucknow University, for the year ending June, 1949.]

Groves (K.), Johnson (W. H.), & Walker (K. C.). **Uniformity of spray material distribution by stationary orchard spray systems.**—*Bull. Wash. St. agric. Exp. Sta.* 515, 22 pp., 9 diags., 5 graphs, 1950.

Detailed results are given of the sampling of experimental insecticidal spray mixtures at various points in the pipe systems at the Tree Fruit Experiment Station orchards, Wenatchee, Washington [*R.A.M.*, 27, p. 511]. The photometric apparatus [loc. cit.] designed to measure continuously the spray mixture concentration may be inserted at any point in the system. It consists of a piece of 1-in. transparent methacrylate tubing fitted with hose and pipe connexions. On one side a 6-volt lamp is mounted and on the other a barrier-layer-type photo-cell, the light being directed through slits in shields fitted to the tube. This part of the system is enclosed in a light-tight box. In these tests the instrument was calibrated by pumping various concentrations of lead arsenate through the tube; changes in concentration of 0·05 lb. were easily detected. The photometer showed that lead arsenate mixtures were carried through the pipe lines with satisfactory uniformity under normal operating conditions. Concentration variations were observed for short periods of time, depending on the length and size of the pipe, when spray operations started again after a stop. Rates of flow of 3 gals. per min. or more picked up any lead arsenate that settled. In laboratory tests, to keep the lead arsenate in suspension, minimum flow rates of 2·2, 3·2, and 4·2 gals. per min. were required in $\frac{3}{4}$-, 1-, and $1\frac{1}{4}$-in. pipe, respectively.

Groves (A. B.). **Sulfur fungicides in fruit production.**—*Soil Sci.*, 70, 1, pp. 67–72, 1950.

The author reviews the use of fungicides in fruit production from the standpoint of a plant pathologist and concludes that, despite the numerous and far-reaching changes continually taking place in the entire plant protection situation, it still fits into a complete production programme.

Summary tables of biological tests sponsored by the Chemical-Biological Coordination Center.—Published by the National Research Council, Washington 25, D.C., 2, 2, pp. [6+] 78–140; 3, pp. [6+] 141–201; 4, pp. [6+] 202–253; 5, pp. [6+] 254–310, 1950. [Mimeographed.]

In volume 2, No. 2 of this publication [cf. *R.A.M.*, 29, p. 630] the following compounds inhibited the growth of *X*[*anthomonas*] *phaseoli*: 2, 3-dichloro-1, 4-naphoquinone at 0·1 mgm. per ml., α, β-dichromo-β-phenyl-propriophenone (0·07), cyanophenyl-ethyl ester of pyruvic acid (0·07), and 2, 5-dichloro-3-thiophenecarboxylic acid (0·055). The following inhibited spore germination of *Stemphylium sarciniforme* and *Sclerotinia fructicola*: 2-ethyl-1-(2-thienyl)-1-butanone (1,000 and 10,000 p.p.m., respectively), 2-(3-thienyl-mercapto)-ethanol (10,000), phenyl 2-thienyl ketone (1,000), 2-amino thiazole (1,000 and 10,000), 2-thiophenecarboxylic acid (100 and 1,000), 5-bromo-2-thiophenecarboxylic acid (100), 5-chloro-2-thiophenecarboxylic acid (100 and 1,000), and 2, 5-dichloro-3-thiophenecarboxylic acid (100); 5-chloro-2-thienyl methyl ketone was effective against the former fungus only (10,000), and tri-3 thienyl thiophosphate against the latter only (10,000).

In No. 3, decyl sulphide is listed as active against *X. phaseoli* (0·06 mgm. per ml.); α, α, α,-trichlorotoluene gave 100 per cent. inhibition of growth of *Aspergillus niger* spores, *p*-hydroxy-butyl exter of benzoic acid 88 per cent., and isosafrole and *o*-phenyl phenol acetate each 87 per cent.

In No. 4, streptothricin hydrochloride (0·06 mg. per ml.) and disilver salt of alkenyl-succinic acid (0·07) are listed as active against *X. phaseoli*, and 2, 4-dichlorobenzaldehyde, dehydroacetic acid, mucobromic acid, and 5-chloro-salicylaldehyde as giving 100 per cent. inhibition of growth of *A. niger*.

In No. 5, bromomethyl 1, 2, 3, 4-tetrahydro-9-phenanthryl ketone (0·11 mg. per ml.) and mucobromic acid (2·26) are listed as active against *X. phaseoli*; 2, 2, 3, 4, 5, 5-hexachloro-2, 5-dihydro-thiophene, and 3-thiophenethiol gave 100 per cent. inhibition of growth of *A. niger*.

MARSH (R. W.). **Report on a visit to Canada and U.S.A. to study research and development in agricultural fungicides, March 1949 to February 1950.**—36 pp., London, Agricultural Research Council, [1950. Mimeographed.]

This report reviews the soil, seed dressing, systemic, and foliage fungicides used in Canada and the United States, and the application of certain materials on fruit, vegetables (with particular reference to potatoes and tomatoes), and flowers. Methods of applying fungicides and moistened dusts, and the use of therapeutants for plant virus disease control are described. Notes are given on disease control by the modification of soil factors and by resistant varieties, and on regulatory work and fungicide imports from Great Britain and Sweden. A reference list of the proprietary and common names of the fungicides used and indexes are provided together with specific recommendations for certain materials.

JOHNSON (R. K.). **A mechanical sprayer operated by one man.**—*N.Z. J. Agric.*, 81, 1, pp. 39–40, 2 figs., 1950.

During the 1948–49 season a simple and very effective mechanical spraying attachment, which can be fitted to any one-man-operated crawler or portable outfit, was devised and used by a New Zealand fruit-grower with conspicuous success. A 35-gal. per minute pump, driven by the tractor engine, is mounted on the same 2-wheel chassis. The spraying attachment, mounted at the rear of a 400-gal. vat, consists of two 8-nozzle spray brooms set at opposite angles clamped in movable brackets, one on each side of the chassis but bolted together to act as one unit. The brooms are chain driven off a shaft and are raised and lowered in a way similar to the normal hand-operated motion. They have curved heads to ensure a wide arc of spray fore and aft. For spraying tall and spreading trees an adjustable extension boom consisting of a 10-ft. length of 1-in. piping inside 8 ft. of $1\frac{1}{2}$-in. piping and culminating in two curved 7-nozzle broom heads, is mounted at the centre and rear of the vat.

Distribution Maps of Plant Diseases.—Maps 193–216. Issued by the Commonwealth Mycological Institute, 1950. 3*s.* 9*d.*

The ninth year's issue of this series of maps showing the world distribution of major crop diseases [*R.A.M.*, 29, p. 112] comprises (No. 193) *Gloeosporium concentricum* on cabbage, cauliflower, etc., (194) *Elsinoe phaseoli* on Lima bean (*Phaseolus lunatus*) and other *P.* spp., (195) *Puccinia helianthi* on sunflower and other *Helianthus* spp., (196) *Venturia cerasi* on cherry, (197) *Cercosporella brassicae* on cabbage, cauliflower, etc., (198) *Fusicladium carpophilum* on peach, plum, almond, etc., (199) *Taphrina cerasi* on cherry and related *Prunus* spp., (200) *Uromyces fabae* on broad and field beans (*Vicia fabae*) and vetch, (201) *Phytophthora phaseoli* on Lima bean, etc., (202) *Oospora pustulans* on potato, (203) *P. boehmeriae* on *Boehmeria*, *Citrus*, apple, (204) *P. porri* on leek, (205) *Pythium vexans* on potato, Gramineae, etc., (206) *P. irregulare* on Gramineae, legumes, etc., (207) *P. ultimum* on various hosts, (208) *P. debaryanum* on various hosts, (209) *Puccinia pringsheimiana* on gooseberry and *Carex*, (210) *Phoma foveata* on potato, (211) *Puccinia menthae* on *Mentha* spp., (212) *P. purpurea* on *Sorghum* spp., (213) bean mosaic virus on beans (*Phaseolus* spp. and *Vicia* spp.), (214) *Thecaphora solani* on Andean potato (*Solanum andigenum*), (215) *Puccinia kuehnii* on *Saccharum* spp., (216) *P. asparagi* on *Asparagus*.